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RESERVE

THE LATIN AMERICAN FARMER

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ECONOMIC RESEARCH SERVICE



FOREWORD

A continuing review and analysis of general economic and agricultural developments in Western Hemisphere countries are carried out as a part of the global research effort of the Foreign Regional Analysis Division of the Economic Research Service, U.S. Department of Agriculture.

Principal research subjects are situation and outlook, demand and competition, and long-range outlook. Results of this research are primarily intended to provide concerned groups, including farmers, businessmen, members of universities, and government agencies, with information on developments abroad which affect U.S. agriculture and trade and which relate to broader questions and issues. This report is based on such research. Its objective is to identify the role, problems, and needs of the much discussed but little understood Latin American farmer. It describes the general structure of Latin American agriculture and its relationships with other industries, insofar as they affect the well-being of farm families. These change very slowly and statistics reflecting such changes as do occur commonly do not become available until some years later. The scope and content of the report are, therefore, necessarily broad. As a pioneering effort, it is intended to focus attention and to stimulate additional research on the farmer--the central character in the intensifying drama of Latin American food supply.

John Hopkins has used many sources for this report. Much of the information was developed during a study (1962-64) by the Inter-American Committee for Agricultural Development (CIDA), Inventory of Information Basic to Planning of Agricultural Development in Latin America, which he directed. Many of the basic data were taken from the decennial censuses, the next one of which will be taken in 1970, with publication of results beginning 2 or 3 years later. In addition to the censuses, there were occasional surveys on some subjects, such as those taken by CIDA. Where pertinent data were available from such surveys, they were used in this report to update the latest census figures.

Data from scattered surveys and from observation were the major sources for information on living conditions of farmers, their diets, the condition of their houses, wages of farm labor actually paid, and the ratios between farm and urban income.

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EXPLANATORY NOTES

"Latin America," as used in this study, includes the Western Hemisphere except for Canada, the United States, its dependencies, and the Commonwealth of Puerto Rico; and certain minor dependencies of other countries, such as St. Pierre and Miquelon, and of course, the polar areas. General references to Latin America in the report are to all of the Latin American countries and dependencies. Specific references, however, are usually to either the group of 19 or 23 republics listed in app. table 1.

For quick reference and convenience of the reader an outline map of the northern part of Latin America is shown inside the front cover of this report and an outline map of the southern part of the region is given in the rear cover.

The metric system is usually used in this report. Length is expressed in meters (39.37 inches) and kilometers (0.6214 miles); area is expressed in square kilometers (100 hectares or 0.3861 square miles) and hectares (2.4711 acres); volume is expressed in kilograms (2,2046 pounds) and tons (2,204.62 pounds or 0.9842 long tons). U.S. equivalents of metric measurements are given as appropriate.

U.S. dollars are used throughout this report except where otherwise indicated. When currency units of other countries are given, dollar equivalents are given at the prevailing rates of exchange.

Statistical usage includes "0" for none, "negl." for quantities of less than 0.5 of units shown, "n.a." for not available, and -- for not applicable.

When Spanish and Portuguese terms are used, the English equivalents or meanings are indicated along with the first usage. Accents for Spanish and Portuguese words are omitted due to reproduction difficulties.

Names of certain companies are used in this publication solely for the purpose of providing specific information. Mention of these companies does not constitute the endorsement of their products by the Department of Agriculture or imply discrimination against other products.

HIGHLIGHTS

During 1950-65, the population of Latin America grew at the rate of 2.8 percent a year. During the same period, agricultural output grew at 3.6 percent, and nonagricultural production, at 4.9 percent a year. Considering the difficulties that face them, Latin American farmers deserve much credit for their production achievements. Governments have given them very little help in the form of improved roads or schools, or in price supports or other measures.

Many plans and programs have been announced or adopted, but most of these have been intended to reduce prices of farm products to urban consumers or to increase exports rather than to raise farm income.

One of the foremost Latin American objectives has been to stimulate local industries. Hence there are stiff import taxes on farm equipment and supplies to protect these industries. There are also taxes on exports of farm products to obtain revenue.

Total population of Latin America in 1965 was estimated at 241 million; about half of the population gained a living from agriculture. Many large- or medium-scale Latin American farmers are using modern methods and are living well. But a much larger number of small-scale farmers still use the laborious methods of a quarter century or even of a century ago. These eke out a bare subsistence, and like the rural laborers, often earn only a third or even a fourth the income received by urban workers.

Writers on economic development are occupied chiefly with urban problems and show but little concern about farmers. The common view is that farmers should produce cheap food and raw materials and not crowd into the cities where they would compete for existing jobs.

Labor efficiency on Latin American farms, especially on the smaller ones, is extremely low, compared with that on farms in many other countries. Six or 7 percent of the economically active population of the United States and of England is able to produce the food and other agricultural requirements of those countries. In Western Europe, about 25 percent of the economically active population is engaged in agriculture. In Latin America, however, the typical figure is about 50 percent, although in recent censuses it has varied from 19 percent in Argentina to 67 percent in Honduras and even more in Bolivia and Haiti.

The small farm units and antiquated farming methods in Latin America account for the low level of farm earnings. Where farms are larger, and more effective methods are used, earnings are much more satisfactory.

With the increasing complexity of agriculture, ability to read and write is just as important for those on farms as in cities. Unfortunately, education for farm people has been badly neglected in all Latin American countries except Costa Rica, Argentina, Uruguay, and Chile. Except for Costa Rica and Uruguay, the literacy levels reported in the 1960 series of censuses, where data are available, were from 25 to 40 percentage points lower in rural than in urban areas.

The censuses, however, understate the difference. The term "rural" in the censuses ordinarily refers to places of less than 2,000 population, and therefore includes villages and small towns. Most of these have schools, but in the actual farming areas, there are very few. Moreover, there is a great difference in the number of years that pupils remain in school in rural and urban places.

In Brazil, for example, rural schools ordinarily offer only four grades, many, only three, and the dropout rate is high. Enrollment in the second grade in rural schools in 1963 was only 63 percent as great as in the first grade in the state capitals--which are usually the larger towns. Outside the capitals, it was only 38 percent as great in the second as in the first grade. In the fifth grade in the capitals, there were only 20 percent as many pupils as in the first grade, and outside the capitals only 5 percent as many as in the first grade.

In the fifth grade, the number of pupils in urban schools in Mexico was 44 percent of the number in the first grade; in Colombia, it was 32 percent; in Guatemala, 26 percent; and in Honduras, 25 percent. Enrollment in the fifth grade in Mexico was 3 percent as great as in first grade; in Colombia, it was 2 percent, and in Guatemala and Honduras, 1 percent.

It is in deficient primary education, more than in anything else, that we find the reason for the backwardness of Latin American agriculture. Of course, a number of things of a noneducational nature can be done to improve the farmer's condition. But a progressive, modern agriculture can scarcely be imagined with a farm population that is largely illiterate.

The CIDA Inventory study, made in 1962-64, found 54 university-level colleges or schools of agriculture and about 25 university-level schools of veterinary medicine. These schools contained some 7,000 or 8,000 students, and graduated 1,200 to 1,400 each year. Students and professors of these schools, in a sense, constitute the elite of Latin American agriculture. They provide personnel to fill technical positions in the ministries of agriculture, and in research and extension work.

There is a wide gap between this elite group and the mass of ordinary farmers. Only 10 to 30 percent of students and professors come from the farm and can see farm problems from the same viewpoint as can the practical farmer.

Funds available to these agricultural schools are extremely limited. Salaries are low and the proportion of part-time professors is high. With all of these drawbacks, it is gratifying to find that the schools and universities contain so many capable and dedicated professors who have done outstanding work in their respective fields.

Both research and extension work would be more effective if advisory committees of farmers were set up to give guidance in planning and administration of programs. In a few cases, this has already been done. In Argentina, the Institute of Agricultural Technology (INTA) has advisory committees composed of farmers and businessmen. Argentina also has the Rural Society for Agricultural Experimentation (CREA)--organizations of large farmers who study the results of various farm methods being used by the members. In 1966, there were 73 of these cooperative groups, each consisting of 12 to 16 large farmers, each employing an agronomist or other specialist to analyze farm records and advise members concerning improvement of methods. In Brazil, two large and effective cooperatives provide service and advice to members, and there are a few similar organizations in Peru, Colombia, and some other countries.

In most countries, the official agencies show the effects of inadequate coordination and of insufficient funds. Many important subjects, including farm management and domestic science, receive little or no attention. Each of these, if well directed, is capable of making important contributions to farm income and welfare.

Latin America is fortunate in that it still has large areas of unsettled land or of land that is still used only very extensively. Little has been done by governments to plan for the systematic use of such land. Some is of low fertility or is too rough or too dry for use as cropland and much is so far removed from centers of population, that present transportation costs to markets are almost as great as the value of the crops. Construction of roads or railroads would bring much of this land into use and would also lead to intensified use of land now being used as rangeland.

Land capability maps for the unsettled areas are needed to provide a basis for directing new settlement into the best areas and away from lands that are not suitable for agriculture. At present, new lands are being settled in a haphazard manner, much of it by squatters. In a recent Brazilian report, it was stated that increased food production in that country had been accomplished largely by the continuous process of pushing back the frontier rather than by improving methods of culture. Once an improvement in methods begins, Brazil may be expected to greatly increase the food supply and other agricultural production.

Shortage of capital, especially for financing agriculture, is one of the most common and persistent difficulties in newly developing countries. The governments of Latin America have adopted many programs for easing this shortage, but achievements have not been outstanding. Most of the programs have involved the loaning of government funds but--unfortunately, the governments seldom have enough revenue for their normal operations. Consequently, they cannot be expected to provide enough capital to finance agriculture, which is nearly always the largest sector of the Latin American economies.

Farmers must therefore turn to such other sources as they can find. These include advances from ordinary storekeepers, dealers in farm equipment and supplies, exporters of farm products, and friends and relatives.

The cost of farm credit is usually high. Small loans made to farmers are expensive to administer, and interest rates are high because of the rapid and widespread inflation.

Interest rates are lowest (largely because inflation is least) in Mexico and the Caribbean area. Chiefly because of rapid inflation, they are higher in the four southern countries, where funds obtained through commercial channels have recently been at nominal rates of 2 to 3-1/2 percent a month.

The farmer's own labor and that of his hired men in the slack season have been one of the largest, if not the largest, sources of new farm capital. Other than the land, the largest element of investment on a small or medium-sized farm consists of coffee, cacao, banana, and other fruit trees; fences; drains; small buildings; livestock; feeds; and seeds carried over from year to year. Funds must be borrowed, however, for such items as tractors and other machines, and for fertilizers and some other supplies. On most types of farms, although not all of them, farm-made items provide the largest part of new capital.

An appreciable amount of capital for agricultural purposes has come from international agencies, including the Agency for International Development (AID), the International Bank for Reconstruction and Development (IBRD) and its affiliated International Development Association (IDA), and the Inter-American Development Bank (IDB). Loans approved by AID for agricultural purposes up to September 1966 amounted to a total of \$153 million of a world total of \$3,833 million. Agricultural loans by IBRD and IDA for Latin America were \$141 million of a world total for agriculture of \$2,562 million, and those by the Inter-American Bank were \$339 million of a total of \$1,525 million.

Not all of these funds actually reached farmers, but may, nevertheless, be ultimately beneficial to them. Some loans are made for improvements in experiment stations or agricultural colleges. Others are made for agricultural planning, for construction of irrigation systems, resettlement operations, and for a number of other purposes.

A consequence of the policy of encouraging industrial development at the cost of agriculture has been that farmers find themselves producing for a highly competitive market but buying equipment and supplies from industrialists or dealers who occupy positions of monopoly or oligopoly. Along with this there has been a shift in the political balance. Forty or 50 years ago, the dominant social and political groups consisted of large landholders. Since that time, most of the old owners have died and their sons have moved to the cities, where they have become merchants, manufacturers, lawyers, doctors, and so on. Agriculture suffers because these city-dwelling farmowners pay more attention to their urban businesses than to their farms.

Meanwhile, industry and commerce have grown rapidly and dominate economic policy to a greater extent than does agriculture. The tendency toward industrial monopoly in most countries is strengthened by the small size of the industrial market. It is not uncommon for production and sale of specific products to be dominated by only two or three firms in a given country, or even by only one firm. Even the Latin American Free Trade Association (LAFTA) and the Central American Common Market (CACM) have sanctioned this semimonopolistic pattern, and governments seem not to realize the long-run problems which this involves.

Membership in LAFTA brings with it marked concessions from other members of the group and high protection against nonmembers. As an example, Paraguay is a member of LAFTA: If a Paraguayan farmer buys fencing wire or any one of a long list of farm equipment imported from another member of LAFTA, he will pay duties and other import charges of only 5 or 6 percent. If he buys a similar product from outside the LAFTA group, he must pay heavy import charges. Such charges often determine whether the material is to be used at all.

Shortly after 1960, for example, it was widely believed in Argentina that it "did not pay" to apply fertilizers to wheat and other crops, although it was known that they materially increased yields. At that time, the price of a ton of superphosphate delivered to the farm in the wheat-producing region of Argentina was equal to the price the farmer would receive at the farm for 5 to 6 tons of wheat, while in the U.S. State of Kansas, the delivered price of a ton of superphosphate was equivalent to the price paid at the farm for between 1-1/2 and 2 tons of wheat. Two or 3 years later, Argentina reduced freight rates and other charges on fertilizer imports, and the use of fertilizer after that time showed a marked increase.

Similar comparisons have been made for other crops and in other regions. ECLA is well advanced on a study of the prices of fertilizer and of various other materials. Much of the reluctance to apply fertilizers can be attributed to high prices of these materials, caused by high transportation charges, high import taxes, or high profit margins charged by dealers. As these situations are corrected, farmers' incomes may increase materially in many regions.

THE LATIN AMERICAN FARMER

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INTRODUCTION

In Latin America, some of the cities, including Buenos Aires, Rio de Janeiro, Sao Paulo, Lima, and Mexico City, are expanding at a phenomenal rate, and many other cities and towns have increased by half or have even doubled in the past decade. Outside the cities, however, the situation is different. Small farmers increase in numbers but continue, for the most part, to use the laborious and ineffective methods of a quarter century or even of a century ago. Even on large farms, there is a superabundance of laborers, often performing with human muscle, operations that are accomplished elsewhere with mechanical or animal power.

An increasing awareness of these problems under the Alliance for Progress and related programs calls for more attention directed specifically to the needs of the population living and working on farms. Many programs and projects have been proposed to benefit agriculture in a general way. Too often, however, they have benefited groups or industries only indirectly connected with farmers. New roads are built between cities but little is spent on farm roads. Capital, ostensibly to benefit agriculture, is used to build marketing facilities or storage space for crops after they have left the farm, or for development projects for future use, rather than being placed at the disposal of farm operators. In education, buildings and equipment are provided for universities, but primary schools in farming areas are few, and many offer only 3 or 4 years of schooling so that farm children who attend them cannot qualify for the institutions of higher learning. Although there are price control programs, they commonly provide low prices to consumers rather than reasonable income to farm producers. Special concessions are given to manufacturers of farm equipment or supplies to assure their profitable operation, but little is done to assure reasonable prices of such items to farmers.

Most of these programs are commendable and likely to provide some ultimate or indirect benefit to farm people. For the most part, however, the farmer, his family, and his hired men have been neglected and left to struggle unassisted.

Data Sources and Limitations

In attempting to synthesize the influences affecting the Latin American farmer, a comprehensive account is needed of as many of the various fields of influence as possible. This requires accurate statistics and objective observations concerning non-quantitative influences as well. It also involves balance, objectivity, and selection of sources and types of information that are really pertinent to the farmer's welfare.

A considerable amount of factual information used in this report is from the studies of the Inter-American Committee for Agricultural Development (CIDA), especially from the studies directed by the writer and used in the Inventory of Information Basic to Planning of Agricultural Development in Latin America (62).¹ These studies were conducted under the Alliance for Progress program with the support of the Organization of American States (OAS), the United Nations Food and Agriculture Organization (FAO), Inter-American Development Bank (IDB), the United Nations Economic Commission for Latin America (ECLA), and the Inter-American Institute for Agricultural Science (IICA). Studies involved determination of the presence or absence of a fairly long list of data, including natural resources, use of land, agricultural production, human resources, institutions and facilities serving agriculture, agricultural capital and credit, organization and income of the agricultural units, marketing, price studies, and government policies in agriculture.

Under the Inventory studies, regional and country reports were issued which covered all Latin American countries, except Cuba. Data for the five Central American countries (Guatemala, Honduras, El Salvador, Nicaragua, and Costa Rica), however, were combined in a single report. The Inventory studies also included a bibliography of over 5,000 items.

Other CIDA reports utilized as sources for this report include studies of land tenure (chiefly with regard to farm size) for seven countries and a study of farm credit in Costa Rica. Additional studies of farm credit and rural education are still in progress.

A few years ago, accurate information on many aspects of Latin American agriculture was very scarce. During the past 10 or 15 years, most of the governments of the region have greatly increased their collection and publication of data on areas planted, production, marketing, and prices. The censuses of 1960 and the years immediately thereafter provided much more complete information than did the earlier censuses in most countries. Much of the statistical progress is due to efforts of the Inter-American Statistical Institute (IASI), ECLA, FAO, and other international agencies.

In the past, information on prices of farm products and materials used by farmers usually referred to central market prices and not to prices or costs at the farm. It is only recently that the importance of farm prices has been realized and that such data collection and analysis have begun. The ECLA group is well advanced on studies of the elements of cost, merchandizing margins, and other influences that determine the prices that farmers actually have to pay for farm equipment, fertilizers, and pesticides.

The reader will want to know, not only the identity of the crop and livestock enterprises but also their geographic location. Unfortunately there are so many crops that a graphic representation of agriculture as a whole is not possible. There is, however, one crop found in Latin America wherever there is a settled agriculture. This is the corn or maize crop, which is grown in all parts of the area and is used both for feed and for human food. In a sense, therefore, the corn crop indicates the location of Latin American agriculture. Figures 1 and 2 are dot maps showing corn production. These show the concentrations in Argentina, in parts of southern Brazil, and in areas of Mexico and Central America. Since an appreciable part of the corn crop is used for human food, it will be noted that there is a close resemblance between the corn production map and the distribution of human population.

An increasing number of governments are collecting current information on crop areas, yields, current crop conditions, numbers of livestock, and animal production. Market news services have begun in several countries. All of these clarify the farm income situation and help explain variations.

Information on income and expenditures of farmers is still very deficient. The same is true of wages actually paid to farm laborers as distinguished from rates that are supposed to be paid according to labor laws and regulations. The variations in income among

¹ Underscored numbers in parenthesis refer to the literature cited, page 115.

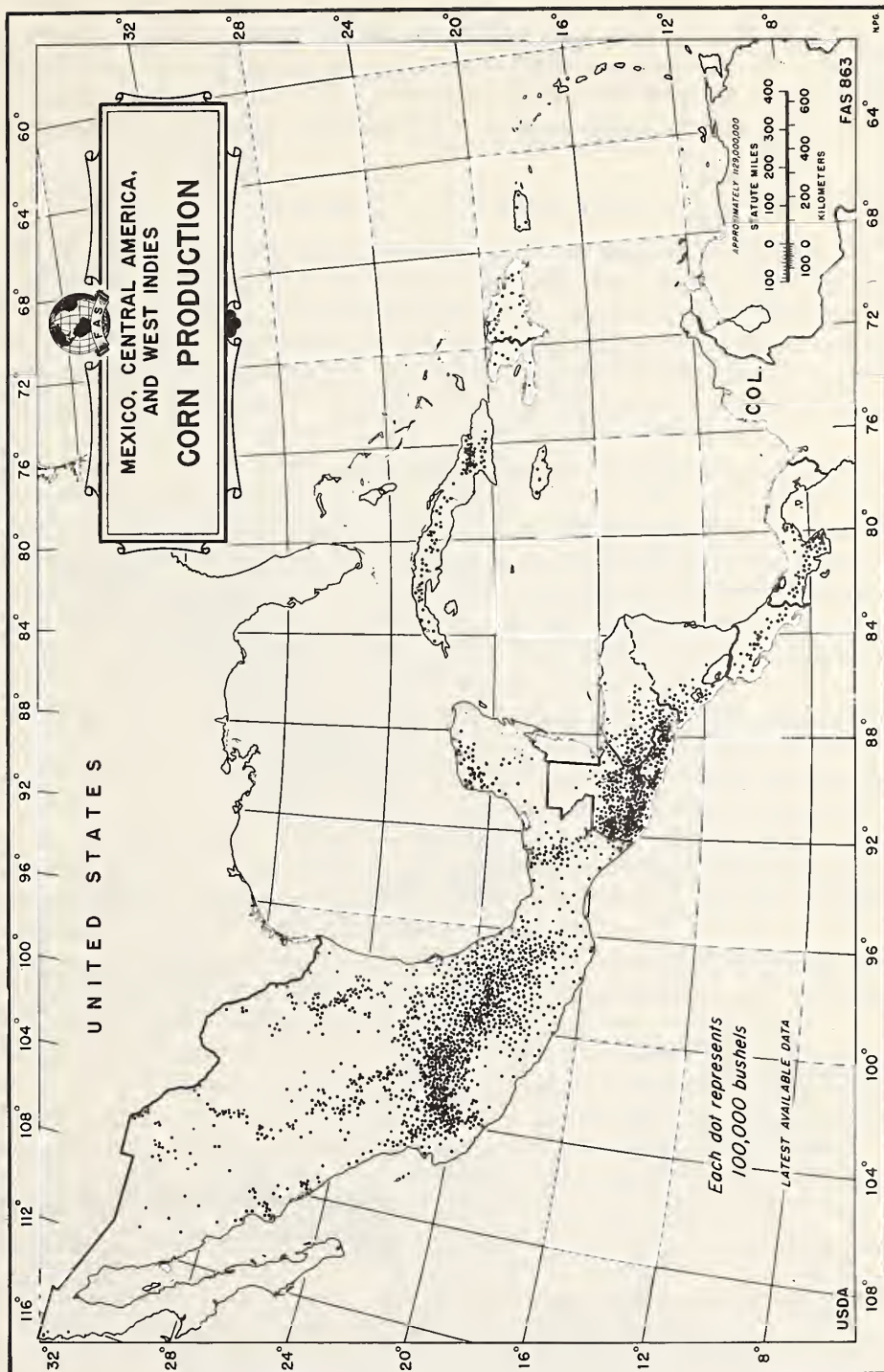


Figure 1



Figure 2

different sizes and types of farms and among different farming areas have only begun to be studied.

In discussions of Latin American agriculture and probable effects of proposed policies and programs, it was necessary a few years ago to depend chiefly on economic hypotheses and theoretical models. With the increase in data and information, it is now possible to develop more substantial analyses.

Even with the best available statistical data, many gaps remain. When it comes to questions of policy, value judgments are still necessary because some of the most important influences cannot be put into quantitative terms. Expertise is unavoidably specialized, and each scientist often observes only a single aspect of a problem.

Structural Defects in the Economy Which Affect Agriculture

The role of agriculture is to provide necessary food and raw materials. Proper fulfillment of this role requires that the farmer operate economically and receive a commensurate return. Economic operation hinges on the proper mix of technology and resources and on the efficient and balanced use of land, labor, and capital. A commensurate return depends primarily upon equitable prices, income distribution, and support of public services. Within this framework, the farmer is largely the creature of his economic environment.

Principal structural characteristics and deficiencies of the Latin American economies as they affect the farm population are the following:

1. In each Latin American country, except for the two or three largest countries, the market is too limited to support modern industries in efficient, large-scale operation with enough firms to provide effective competition. This affects the organization of international trade and the prices which farmers must pay for supplies and equipment.

2. In most of the countries, farmers suffer from deficiencies in the infrastructure of transportation, marketing facilities, education, and health service.

3. A large percentage of the farmers follow antiquated methods of crop production which employ high labor and low capital inputs per hectare and result in low yields for both land and labor in comparison with the United States and Western Europe. Except in Argentina and Uruguay, a similar situation applies for livestock production. A major contribution to this situation is the low level of technology due largely to the lack of well-planned research and to an inadequate system of extension service. Effective modern methods are employed on some medium-sized and larger farms, but the smallest farms generally continue to employ methods of a century ago.

4. There is an inadequate supply of capital for agricultural use, although this is less serious in Mexico and Central America than in the countries farther south. It is especially bad in the countries with rapid inflation.

5. In most agricultural areas, there is an excess of manpower. This is especially true of the Andean regions. Unemployment or underemployment is, however, partly seasonal and is particularly pronounced in areas of minifundia (small-plot farming). But even the large farms in areas of excess population are commonly overstaffed.

6. More profitable use could be made of much land already in farms, and large areas of underutilized and unutilized land which exists in all but two or three countries could be used for farming. Although large areas of unutilized land are of inferior quality, much has a high productive potential.

7. Maldistribution of land is a basic problem. The large number of very small farms leads to a waste of manpower and low income for the families on them. At the same time, many of the largest farm units are past the point of optimum size for production of the more intensive crops. Many of these large units may have been suitable when population was smaller and when a different economic structure permitted a more extensive land use.

8. There is a wide prevalence of monopoly or oligopoly in Latin American industry and business as the result of limited markets in most countries and the near-universal government protectionism. For example, in most countries certain important products are produced by only two or three industrial firms and sometimes only one. This structural defect--unearned profit with high price and low output--is a far-reaching impediment to economic and, in particular, to agricultural development. It is a principal contributor to many farm problems, including high prices of production requisities and excessive rural population.

9. There has been an almost universal tendency to favor urban development. Government officials, even in agriculture, are mostly of urban origin. Foreign trade is protectionist and regulated chiefly for the benefit of industrialists; principal export taxes are usually levied on agricultural commodities, with proceeds largely used in nonfarm sectors.

Other problems and defects of the economic structure affecting agriculture might be added. Those that have been listed, however, are the most serious contributors to the backwardness of agriculture and to the low incomes of the farm people.

Proposed Remedies

Latin America is a heterogeneous region with wide variations in types of agriculture. Many medium- and large-scale farmers are using modern methods and living well, but a much larger number on very small farms are eking out a bare subsistence. Wages for farm laborers in most places are much lower than for work of a corresponding type in nearby cities--often only a third or a fourth as much. In more densely settled regions, especially in the mountainous areas, farmers and laborers receive few services and are outside the main current of the economy. The common urban view is that country people should produce cheap food and raw materials and not crowd into the cities where they would compete for jobs.

This general lack of real concern for the farm population also extends into the field of economics. Writers on economic development are generally preoccupied with progress of nations as units, rather than with the condition of farmers or other groups composing the population. The sociologists and the agrarian reform groups are the main exceptions. Writers in these fields show concern about housing in cities, deplorable conditions in urban slums, and hardships of laborers and of families living on farms of inadequate size. However, analysis of the latter group is seldom very profound, due in part to lack of information. The difficulty of farm workers or of minifundistas ("dwarf farmers") is assumed to be caused almost entirely by the small size of the plots occupied.² The fact that many minifundistas are part-time farmers and the implications of this fact are seldom examined. This group clearly includes families with no source of income except that from the minifundia. But it also includes others who are primarily laborers living on small parcels of land that they own or rent, persons whose primary employment is in nonagricultural activities, and persons living on small plots in the outskirts of cities and engaged in urban occupations.

Many writers on Latin American economic topics discuss at length the needs of the region for capital and the trends of foreign trade. Estimates are made of gross national income and the contributions to it by principal economic sectors. There is little discussion of the price relationships within the different sectors that are responsible for the conditions and of particular importance to farmers.

²Any operator of a minifundia (farm of insufficient size) is referred to as a "minifundista." He may be an owner or any type of renter.

Several widely held proposals are put forth as the key to improving the lot of the farm population. Perhaps the one most commonly heard in recent years has been redistribution of land in large holdings among minifundistas and laborers. This would at least benefit the recipients of such land for the immediate future, but it would not help other farm groups or solve the numerous other problems. Some of the other proposals are as follows:

To increase the number of research workers and extension agents, a trend that has already been underway for some time and especially during the past quarter century.

To increase the support of superior level agricultural colleges and to graduate more trained agriculturists.

To increase the amount of credit available to farmers.

To increase the market for Latin American products by developing wider markets within the region. This, however, refers more to industrial trade than to trade in farm products, since most of these countries produce similar crops.

To provide more roads in farming regions, for which there is an obvious need.

To increase the revenue base for the governments by higher income and property taxes to pay for the new roads and schools. Increases in tax rates, however, are no more popular in Latin America than elsewhere. This proposal is more likely to be heard in the United States than in the countries directly concerned.

To speed up even more the rate of industrialization and other urban development to provide more markets for farm products.

To produce more food for undernourished people in Latin America and elsewhere, although it is not clear how the farmers are to be paid for it.

More proposed remedies could be added to the list, but these are the most common. Each remedy has its own group of advocates, and each has its opponents who usually advocate some other scheme. Generally, the proponents of each of these individual measures have a tendency to see it as a panacea for the entire complex situation. Also, most of these single or key-remedy proposals reflect the common failure to consider the role of agriculture simultaneously from the standpoint of the farming population and the general economy.

The scope of this report is the Latin American farmer and his well being. The study upon which the report was based had a three-fold objective: First--the collection, analysis, and focus of available data and information pertinent to the most pressing problems of the Latin American farmer; second--examination of Latin American agriculture as to its relationships with other economic sectors and its main policy and program needs, and third--identification of important subject matter areas where adequate data and information were lacking and where further study was needed.

The U.S. Government has shown its concern for the welfare and progress of the Latin American farmer and other population groups in Latin America. Appreciable sums have been donated or loaned and a considerable number of the best scientists have been sent to Latin American countries (upon request) to help those governments work out means of solving their farm problems.

AGRICULTURAL AND ECONOMIC DEVELOPMENT

Agricultural development is conditioned by the economic structure of each country and the position which agriculture occupies in it. The role which agriculture plays is especially concerned with the supply and growth of capital, the rate of agricultural expansion relative to population growth, and the rate of expansion of the nonagricultural sectors.

The Development Process

The development process may be viewed from the standpoint of general economic principles, or with regard to the more specific theories of economic development. The former are concerned with utilization and distribution of the returns from economic resources; the latter involve the growth process as such and its strategic aspects.

General Guidelines

Four general guidelines are important in the utilization of resources, income from their use, and the distribution of income:

1. All economic resources should be utilized and none left unemployed.
2. Each resource should be utilized to the point of marginal returns, both extensively and intensively. Each economic factor, that is, land, capital goods, and even labor, varies widely in its potential productivity and can be used in various combinations with the other factors.
3. The employment of each factor in the various industries or economic sectors should be such that no factor is employed in one industry in such a manner that it yields a smaller return than it would if employed in a different one.
4. Returns to marginal inputs of land, labor, and capital among the various industries or economic groups should be equal. In new industries, however, it is necessary to offer higher returns temporarily to attract needed labor (or capital) until a new equilibrium is established. Also, where agricultural population has become excessive, a somewhat lower than standard wage rate is justified to shift redundant workers to more remunerative employment.

Conformity with such guidelines may be considered an objective or ideal. The result would be a condition which would yield maximum national income, with each factor remunerated at a marginal rate and without discrepancy in returns among units of capital or individual laborers of a given rate of ability and training. Obviously, such a condition does not exist in fact. The concept of equilibrium in utilization and in remuneration of the factors of production is, nevertheless, useful in setting goals at which to aim and standards against which to measure performance.

Development Theories

In recent years, many books and articles have been written on theories of economic development, stimuli to development, and the course followed by economic growth, trends, rates of growth, and so on. A number of these theories have some application in this report. Most of the writers on the subject, however, are interested in urban development, especially manufacturing, which they seem to consider the economic sector of greatest importance. Others are concerned largely with increases in capital, especially investment funds. Still others are concerned with aggregative measurements of production or with other facets of the problem. Relatively few have undertaken to analyze the determinants of farmers' welfare under the specific conditions of Latin America.

There are many different theories and explanations of the manner by which undeveloped countries shift over into a more advanced economic condition. None of the existing explanations is universally accepted. But there are certain ideas that run through most of them. Some of the more common theories are summarized below.

At the beginning of the process, according to several of the available explanations, we find a traditional or primitive type of agriculture which is producing only a subsistence income for the population engaged in it. Later, with improvement in agriculture or with the growth of capital within agriculture, the population is able to increase output and to yield a surplus of food which can be used to support laborers in nonagricultural

activities. The resulting capital can then be used to increase the rate of growth of non-farm goods, thus giving rise to manufacturing and other activities which yield higher returns than would be earned by agriculture. This raises the level of productivity all along the line and gives further impetus to growth.

If progress is to be made, the increase in capital must be more rapid than the growth in population, otherwise the economy is held at a stationary level or may slip back to the subsistence level.

If all goes well, and agricultural output continues to gain over population growth, a surplus of labor develops in agriculture and is induced by higher industrial wages to move into nonagricultural activities, shifting the balance further away from agriculture and expanding the urban industrial structure.

If there should be a temporary decline in rate of population growth and if the full labor force should not be required in urban industries, redundant workers could move back to the farms where they could be supported until they were again needed in industry (20).

Capital is given the key role in the development process by most of the writers on the subject. These writers include Simon Kuznets (43), Gustav Ranis (84), John C.H. Fei, N. Georgeacu-Roegen (37), V.M. Dandekar (18), W.W. Rostow (85), and others. Each of these writers believes that the capital needed for the early stages of economic growth must be extracted in some manner from farmers.

Rostow presents the most elaborate theory of development, dividing the whole process into five distinct stages from a traditional or pre-Newtonian society to a stage of high mass consumption. He is, however, most interested in a stage of preconditions for "economic take-off" and in the "take-off" itself.

Rostow says that there are three conditions essential to take-off: (1) A rise in the rate of productive investment "from, say, 5% to over 10% of national income"; (2) development of one or more substantial manufacturing sectors with a high rate of growth; and (3) a political, social, and institutional framework which exploits the impulses to expansion and gives to growth an ongoing character. In "The Stages of Economic Growth" (85), Rostow presents the following analysis:

The point is that it takes more than industry to industrialize. Industry itself takes time to develop momentum and competitive competence; in the meanwhile there is certain to be a big social overhead capital bill to meet; and there is almost certain to be a radically increased population to feed. In a generalized sense modernization takes a lot of working capital; and a good part of this working capital must come from rapid increases in output achieved by higher productivity in agriculture and the extractive industries.

More specifically the attempt simultaneously to expand fixed capital--of long gestation period--and to feed an expanding population requires both increased food output at home and/or increased imports from abroad. Capital imports can help, of course, but in the end loans must be serviced; and the servicing of loans requires enlarged exports.

It is, therefore, an essential condition for a successful transition that investment be increased and--even more important--that the hitherto unexploited back-log of innovations be brought to bear on a society's land and other natural resources, where quick increases in output are possible.

Having made the general case in terms of requirements for working capital, look for a moment more closely at the question of agriculture and the food-supply. There are, in fact, three distinct major roles agriculture must play in the transitional process between a traditional society and a successful take-off.

First, agriculture must supply more food. Food is needed to meet the likely rise in population, without yielding either starvation or a depletion of foreign exchange available for purposes essential to growth. But increased supplies and increased transfers of food out of rural areas are needed for another reason: to feed the urban populations which are certain to grow at a disproportionately high rate during the transition. And, in most cases, increased agricultural supplies are needed as well to help meet the foreign exchange bill for capital development: either positively by earning foreign exchange, as in the United States, Russia, Canada, and several other nations which generated and maintained agricultural surpluses while their populations were growing (and their urban populations growing faster than the population as a whole); or negatively, to minimize the foreign exchange bill for food--like a whole series of nations from Britain in the 1790's to Israel in the 1950's.

The central fact is that, in the transitional period, industry is not likely to have established a sufficiently large and productive base to earn enough foreign exchange to meet the increments in the nation's food bill via increased imports. Population increases, urbanization, and increased foreign exchange requirements for fixed and working capital are all thus likely to conspire to exert a peculiar pressure on the agricultural sector in the transitional process. Put another way, the rate of increase in output in agriculture may set the limit within which the transition to modernization proceeds.

But this is not all. Agriculture may enter the picture in a related but quite distinctive way, from the side of demand as well as supply. Let us assume that the governmental sector in this transitional economy is not so large that its expanded demand can support the rapid growth of industry. Let us assume that some of the potential leading sectors are in consumers' goods--as, indeed, has often been the case: not only cotton textiles--as in England and New England--but a wide range of import substitutes, as in a number of Latin American cases. In addition, the modern sector can--and often should--be built in part on items of capital for agriculture: farm machinery, chemical fertilizers, diesel pumps etc. In short, an environment of rising real incomes in agriculture, rooted in increased productivity, may be an important stimulus to new modern industrial sectors essential to the take-off.

The income side of the productivity revolution in agriculture may be important even in those cases where the transition to industrialization is not based on consumers' goods industries; for it is from rising rural incomes that increased taxes of one sort or another can be drawn--necessary to finance the government's functions in the transition--without imposing either starvation on the peasants or inflation on the urban population.

And there is a third distinctive role for agriculture in the transitional period which goes beyond its functions in supplying resources, effective demand or tax revenues: agriculture must yield up a substantial part of its surplus income to the modern sector. "At the core of the Wealth of Nations--lost among propositions about pins and free trade--is Adam Smith's perception that surplus income derived from ownership of land must, somehow, be transferred out of the hands of those who would sterilize it in prodigal living into the hands of the productive men who will invest it in the modern sector and then regularly plough back their profits as output and productivity rise." * * *

It is thus the multiple, distinctive, but converging consequences of the revolution in agriculture which give to it a peculiar importance in the period of preconditions. Agriculture must supply expanded food, expanded markets, and an expanded supply of loanable funds to the modern sector.

Even a casual observer will note that the agricultural population, especially in newly settled areas, is composed of a large number of poor and small scale farmers and squatters, plus very few large scale and wealthy operators.

The factual question must be raised whether, with their very limited resources and with a difficult virgin soil to convert into cropland, such a population would be capable of producing a living for its own members, an expanded food supply for the urban population, an increased volume of products for export, and an expanded supply of loanable funds for use in the industrial sector.

Rondo Cameron (12) differs sharply with Rostow on some points (85). He finds no historical support for the assumed increase of net investment from 5 to 10 percent or more of national income during the pretake-off and the take-off period. Recent research, he says, fails to show that any of the present industrialized nations had a 10-percent net investment at the time of take-off into sustained growth. Most of them, he thinks, had rates of 5 to 8 percent and some possibly as low as 3 percent. He thinks that the key influence in getting the growth process under way is found in "a more intensive and efficient use of both the existing stock of capital and of normal increments to that stock" . . . in other words, in technological improvement in use of capital. There are also other stimuli to growth besides those affecting capital directly. These include the more effective use of labor and improvement in human capital, including education.

The idea that development of nonagricultural sectors must start with accumulation of investment funds extracted from agriculture and that these funds must then be transferred to and invested in manufacturing industries becomes harder to support the more one examines the facts. The burden of providing support for industrialization may sometimes have been carried by agriculture, but this had not always been so.

Obviously, there must be enough food to go around. But even this food does not all have to be produced in the developing country. There are cases where developing countries with nonagricultural products to exchange have imported appreciable amounts of food rather than producing it themselves. Thus, we find Venezuela with its great resources of petroleum, and Chile and Peru with their copper and other mineral resources made considerable industrial progress while food production fell short of consumption. Mexico, with its petroleum, copper, and other minerals, has experienced much development during years of intermittent shortages of wheat and corn.

The sources of foreign exchange for Brazil, Colombia, Argentina, and most of the Central American countries, however, are found in coffee, grains, meats, and other farm products. Even these countries do not conform to the belief of most of the writers on economic development--that development of nonagricultural industries must be started by transfers of earnings from agriculture. In fact, it has not been proved that agriculture in the developing countries has been earning such sums of transferable profits as would be needed to establish the new nonagricultural industries.

Insofar as farm earnings find their way into urban investment, the most likely channels are through merchants who have handled or exported the products. This may well be true in other areas as well as in Latin America. After all, there have been cities or towns for thousands of years and the traders and merchants have had at least moderate accumulations of funds available for ventures and investments. It seems more reasonable that the merchants (and perhaps some officials with access to public funds) would invest in promising industrial or other activities than that farmers, even large-scale ones, would step completely out of their spheres of experience and somehow find funds to establish factories or other urban activities.

Many and varied sources of economic impetus are to be found if we study the history of the countries that have achieved a measure of economic development. Among these, discoveries and inventions such as the steam engine, the spinning jenny, the cotton gin, the bessemer converter, the farm tractor, the grain binder, and the combined harvester have been important. Each of these was capable of developing a surplus in the sense of an increase of income over previous levels. Each was capable also of providing large amounts of capital from its earnings after the initial stage of development.

Agriculture itself does, however, contain some possible sources of stimuli to growth. This is particularly true for Latin America. In one country after another, the initial development has clearly started in expanded production of coffee, sugar, cattle, cotton, wheat, or other farm products and has then spread to commerce and transportation. Only much later and after a material expansion of the domestic market has there been any marked growth in manufacturing.

The Role of Capital in Agricultural Development

In the process of development, agriculture, as well as the other economic sectors, requires material inputs of capital. In fact, most types of agriculture in modern years seem to have been consumers of capital rather than contributors to other industries. Although this is not universally true, it is safe to say that most types of farms require more elaborate machinery and equipment as technology advances.

In Latin America, capital inputs begin with the settlement of new lands. Much of the most productive land is covered with jungle and in that state has very little value. Clearing requires large amounts of labor plus capital expenditure for improvements, followed by other capital inputs for several years after settlement. For example, in a large settlement project in Paraguay, it was estimated that the initial clearing and burning of logs and underbrush cost around \$100 a hectare (roughly \$40 an acre) at the prevailing wage of about \$1 a man-day. This removal of the jungle constituted a creation of capital. If such work is done during the slack seasons when crops require little or no care, however, the value of the input becomes a very uncertain matter.

Following the clearing operation, it is necessary to build fences and farm buildings and to dig a well and install some sort of hoist or pump to obtain a supply of water. It is also necessary to buy or raise cattle, hogs, and poultry or other livestock; to erect at least simple farm buildings, including a house; to plant fruit trees or other trees; to prepare the soil for crops; to obtain seed; to plant and care for the corn, cassava,³ cotton, tobacco, or other cash crops; and to buy the tools needed for farm work.

The implements, which must be obtained from outside the farm, comprise in this case by far the smallest element of capital needed. As time goes on and the area in crops increases, however, horses or oxen must be added, and along with them, plows, cultivators, and other implements. If the farm is a large one, the time may come when it is desirable to exchange the farm-raised horses or oxen for tractors. Tractors represent a substantial increase in the farm capital. In addition, they must be bought from outside the farm, and will have a much higher value per unit than do the draft animals.

This process of substituting more expensive capital goods for cheaper, farm-raised goods may continue for decades, as has been the case in the United States and Western Europe. Throughout the entire period of development, the farm is nearly always absorbing capital rather than contributing it to the development of urban industries.

The fact is often overlooked that the farm-produced capital is frequently greater than the purchases of capital goods. This is illustrated by an observation from a study of coffee farms in Sao Paulo by ECLA, the Brazilian Coffee Institute, and the Agricultural Secretariat of Sao Paulo. In this study, it was found that about two-thirds of the total

³ Called "yuca" in Spanish American countries and "mandioca" in Brazil.

capital (excluding land) was produced on the farm. The largest element of capital in this case consisted of the coffee trees, but livestock, fences, farm buildings, and other capital goods were also of importance.

It should be noted that the required types and amounts of capital goods depend largely on the prevailing forms of technology. Undoubtedly, the technical methods actually applied vary to some extent with the available supply and cost of capital. But to an even greater extent, the amount of capital and the form of capital goods depend on the methods that are to be used.

In recent times, farm technology has tended to become more elaborate and expensive, but this is not always the case. Thus, the use of mechanized equipment in planting, raising, and harvesting cotton undoubtedly increases the capital requirement per acre in cotton production but brings a corresponding reduction in the labor requirement. Recent technological changes in grain production imply an increase in capital and a decrease in labor per acre of crop, along with new types of equipment. The shift from open-pollinated to hybrid seed corn means a fundamental shift in farm organization, with specialized farms to produce the hybrid seed.

In dairy production, the growing emphasis on sanitary milk is bringing about changes in dairy farm methods, along with new and expensive cooling equipment and new processes and equipment in milk receiving and distributing stations. At the same time, the observed fact that milk cows can thrive with relatively little shelter in winter means that much cheaper and simpler dairy barns can be substituted for the elaborate and expensive barns formerly used in the dairy regions of the temperate zone. Thus, changes in methods may imply corresponding changes (either increases or decreases) in the amount or forms of capital goods used.

Do farmers actually save enough from their incomes to make any appreciable investments outside the farm? If so, how important are such investments in the process of urban industrial development? As indicated in the last few pages, it seems more likely that farmers are not able to make any large contributions to urban capital. But the facts on the subject are largely lacking. At present, there are only a few scattered observations and opinions.

In view of the farm's increasing needs for capital as its technology becomes more complex, it may well be more realistic to expect a steady flow of capital from urban industries to agriculture. But again, the facts are lacking. Systematic research on the subject would do much to clear up the uncertainties.

Agricultural Production and Population Growth

Has agriculture in Latin America been able to perform its primary function and maintain the level of food production in comparison with the rapid growth of population? Has it been able to increase the output of agricultural produce as a whole, including non-food as well as food articles?

Taking the Latin American republics as a group, food production per capita for the region in 1964-66 was 5 percent greater than 10 years earlier in 1954-56 (appendix table 1).⁴ There were, however, some fairly wide deviations from average. The amount of food per capita in Venezuela was 28 percent greater in 1964-66 than in 1954-56. In Mexico, the increase was 19 percent; in Guatemala, 16 percent; and in Honduras, 13 percent. A 12-percent increase in Bolivia resulted chiefly from the fact that production at the beginning, in 1954-56, was depressed by the chaos that followed the agrarian reform of 1953. Hence, the apparent increase in that country represents chiefly a recovery toward normal.

⁴ "Latin American republics" refers to 19 republics as indicated in table 1 unless otherwise noted.

There were also some declines in food production. Decreases amounted to 33 percent per capita in Haiti and 24 percent in Cuba. In Haiti, the lagging production may be attributed to the continued increase of population and the limited area of land. In Cuba, it may be attributed partly to agricultural disorganization following the political upheavals of the early 1960's and partly to an unfavorable year in 1966.

Net agricultural production followed very much the same pattern as did production of food, although in most cases production of nonfood items increased slightly less than did food.

Thus, we can say that, despite many disadvantages, Latin America was able to increase its output rapidly enough to keep pace with the rise in population in this rapidly growing region. Most rapid increases occurred with crops; crop production was 44 percent greater for the 19 republics in 1964-66 than in 1954-56. Total output of livestock products in the 19 republics at the end of the period was 26 percent above the 1954-56 output. In Haiti and Cuba, however, production of crops and of livestock was absolutely lower at the end of the period than at the beginning.

Agricultural and Other Industrial Growth Compared

How has the expansion of agriculture in Latin America compared with expansion in the nonagricultural sectors? Estimates prepared by ECLA show that agricultural contributions to the gross domestic product (GDP) in 18 Latin American republics increased from 1950-52 to 1963-65 at an average rate of 3.6 percent a year, compared with 4.9 percent for nonagricultural contributions (appendix table 2).

There was considerable variation among countries. The rate of annual agricultural growth for Uruguay was only 0.5 percent, and for Bolivia and Haiti it was 1.2 percent. At the opposite extreme, agricultural production in Venezuela increased 5.7 percent, and for Peru, Mexico, Nicaragua, and Brazil, it increased at rates of 4.0 to 4.8 percent.

In the nonagricultural sectors, there was very little expansion in Uruguay or Bolivia. The most rapid increase in nonagricultural growth occurred in Costa Rica and amounted to 7.0 percent. This was followed by annual rates of increase of 6.0 to 6.8 percent in Venezuela, Panama, Nicaragua, El Salvador, and Mexico.

In other words, industrialization was advancing rapidly in this region, although the rate varied with the natural and economic situations of the various countries.

Estimates of rates of growth of the principal economic sectors for the period 1960-66 show an annual increase in output of 3.4 percent for agriculture and about the same for mining and construction. During the same period, however, manufacturing was growing at a rate of 5.6 percent. The most rapid increase was recorded by production of electricity, gas, and water, and amounted to 8.8 percent. Transportation and communication expanded at a rate of 4.4 percent annually, and commerce and finance at a rate of 4.7 percent. Comparative rates were as follows (35):

<u>Sector</u>	<u>Percent</u>
Agriculture-----	3.4
Mining-----	3.5
Manufacturing-----	5.6
Construction-----	3.2
Electricity, gas, and water-----	8.8
Transportation and communication-----	4.4
Commerce and finance-----	4.7
Public administration and defense-----	3.0
Other services-----	3.7
Gross domestic product-----	4.3

THE FARMERS

Many of the problems and needs of the farm population stem from stratification of that population into comparatively rigid socioeconomic groups. This stratification results from the historical evolution of Latin American society, the characteristics of the rural society, and farm income and living conditions.

Ethnic Composition

Latin America is made up of many races, and there are farmers in all of them. The proportion of the various racial groups on farms, however, is not the same as in the urban or nonfarm groups.

There is no clear-cut statistical summary of these groups, and their composition is gradually changing. Also, the racial classification of the individuals does not remain the same from one census to another. Thus, in Guatemala, the percentage of persons classified as of indigenous races declined from 65 in 1921, to 56 in 1940, and to 54 in 1950, although it may be doubted that such a shift occurred in the actual population.

There are members or survivors of literally scores of Indian tribes from Mexico to Chile with concentrations especially in the Andean regions. There is also an indigenous population scattered through the Amazon valley and in the unsettled regions of Panama, Colombia, Venezuela, Ecuador, Peru, and Brazil. But these do not figure in current agricultural development.

In many areas, the Indian population has increased over the years until their land holdings per family are too small to provide a decent existence. Large numbers of these people are unfamiliar with Spanish but continue to speak their ancient languages. In most countries, rates of illiteracy among Indians are very high.

This does not mean that the indigenous population receives no attention at all. Brazil has its justly famous *Servico de Protecao aos Indios* (Department for Indian Welfare). Guatemala has an agricultural extension service for indigenous peoples parallel with but separate from its Spanish speaking extension service. There are other special agencies to deal with the problems of the Indians in other countries.

Many people of Indian origin have distinguished themselves in the professions, the arts, and government service, although as a group they have been under many handicaps. They have, in general, been governed by the whites since the Spanish and Portuguese conquests and have had much less opportunity than the whites in either economic or political affairs. Consequently, a high proportion of the Indian peoples are minifundistas, farm laborers, or mine workers in Peru and Bolivia.

Persons of Caucasian race are to be found throughout Latin America. A higher proportion of them than of the Indians live in the cities and towns.

From country to country, the white population differs in national origin. In Mexico and Central America, most of the whites are of Spanish ancestry, although many other nationalities are also represented in the population. Spanish ancestry predominates in Colombia, Venezuela, Ecuador, and Peru. In Chile, there are groups of persons of Spanish ancestry and also of German, Swiss, and Italian. In Argentina, the Italian strain predominates as a result of immigration within the past century, but Spanish stock runs a close second. In Brazil, the basic white stock is of Portuguese origin, but in southern Brazil there are settlements of Germans, Russians, and Spanish as well as others. In Sao Paulo, there are many persons of Italian ancestry.

The third racial group in numerical importance (following the white and Indian groups) in Latin America is of African origin. Negroes are predominant in the Antilles, in the coastal areas of Columbia, and, to a lesser degree, in Venezuela. There is also a large Negro population in eastern and east-central Brazil, especially in Bahia.

In addition to the three main racial groups, there are many Japanese in Brazil, especially in Sao Paulo and in some places along the Amazon. Small numbers of Japanese and Okinawans are also located in recently established colonies in Bolivia.

Wherever there are two or more races, there has been considerable mixing and crossing so that all gradations are to be found from pure white to pure Indian or from pure white to pure Negro. In some places, as in northeastern Brazil, the blending of white, Indian, and Negro blood has led to a fairly stable new type.

Whatever common characteristics the Latin American farm population may have, they can hardly be attributed to race since there are farmers of each race and of a wide racial mixture.

The Stratified Society

The Latin American farm population is a society stratified into relatively rigid socioeconomic groups generally identified by income distribution. It has been shown that these socioeconomic differences affect diet and housing. In fact, such influences extend into virtually all social relationships and usually into political relationships as well.

At the bottom of the economic scale is the itinerant farm laborer who has no specific rights or claims except those agreed to by his current employer. Such protection as is extended to him by labor laws is most often ignored by employers.

Next comes the regular or permanent farm laborer. Although his daily wages may be no higher than those of the seasonal or itinerant laborer, he has work for a greater number of days a year and usually has the use of a house of sorts, plus some farm-raised produce for food. There are various gradations within the stratum of regular workers, with skilled workers, such as tractor operators, receiving relatively better wages and perquisites.

Third, is a large group of permanently or semipermanently attached workers on large farms who correspond more or less to the share-croppers of the U.S. South. These are called in various Latin American countries by such names as colonos, inquilinos, yanacunas, huasipungueros or other names. In general, they resemble laborers more than they do independent tenants. They have little or no capital of their own, but operate small pieces of land under close supervision of the landowner or administrator. The landowner decides what crops they are to raise and how they are to care for them. As wages, they receive a share of the crops they produce, are given some sort of a house to live in and often some farm produce to eat. Their income is not necessarily greater than that of the regular farm laborers, but they have more permanence of tenure and a distinct legal status in most countries. Thus, it is difficult for land owners to dislodge them once they become established on a farm.

Fourth, as we move up the economic scale, are the renters. A small group of the cash renter's, pay agreed sums of money for the land they operate. These have equipment of their own and a rather high degree of freedom in deciding what crops to raise and what methods to use.

Another group resembles those categorized in the U.S. census as "crop-share" tenants. These have their own equipment, for the most part, and have a large degree of freedom in planning their cropping systems in consultation with the landowner. The principal difference between them and the cash renters is that they pay for the use of their land with an agreed fraction of the crops they raise instead of with money.

It is the farm laborers and the share-cropper-type workers who constitute the most numerous farm workers. They are the ones who cause the greatest social and political concern and are the hardest to help.

Just as in the United States, there are many forms and variations in farm leases in Latin America, designed to fit the local conditions.

It must not be supposed, however, that the Latin American groups of renters correspond in customs or in lease terms to those called by similar (or similar sounding) names in the United States. Land tenure laws differ from country to country and so do practices in farming. No simple generalization seems possible except that in Latin America the landowner usually has more authority over his tenants or laborers than would a similar landowner in the United States.

Finally, we come to the highest tenure class, the landowner. The landowner group contains a wide range of sizes of holdings and welfare levels. In addition, there is the division between owner-operators and absentee owners.

Among the owner-operators, we find the largest group numerically to consist of the minifundistas who are able to gain from their dwarf farms only a bare subsistence living. As pointed out, this class is most prevalent in Andean regions where land has been excessively subdivided.

There are also numerous operators of family sized farms. With superabundance of labor in many areas, the so-called family farm will usually be found to employ two or three or even a half dozen peons.

At the top of the list are the very large agricultural units (latifundia) each of which may cover many thousands of acres and employ over a hundred laborers. These may be directed and operated by their owners or by hired managers who frequently have an inadequate knowledge either of technology or of the principles of business organization and operation.

This group includes the absentee owner against whom the most intense criticism is directed and who is most commonly blamed for the ills of agriculture. The absentee owner is usually chiefly concerned with urban business or activity and often knows very little about agricultural methods. Although much of the criticism against him may often be misdirected, he seldom makes any contribution to development of the community in which his land is located.

Farm Population and Employment

Latin America is undergoing the most rapid increase in population of any of the major regions of the world (appendix table 3). The population of the 23 republics (appendix table 1) reached 241 million in 1965, a gain of 82 million people in one and one-half decades. The rate of increase was 3 percent or more for 11 countries, 2 to 3 percent for nine countries, and less than 2 percent for the remaining three. Most rapid gains were registered for Costa Rica at 3.8 percent and the least rapid for Uruguay at 1.4 percent. Along with this rapid population increase has come an even faster rate of urbanization.

Migration to the city has reduced the proportion of population living on farms. But this has not been sufficient in most areas to reduce total numbers of rural persons. Census data show that these have continued to increase, although much less than the city population. One interesting speculation is concerned with the effect of the cityward migration on the quality of farm population. The common assumption is that the most capable and energetic persons have moved to the city where they could find more remunerative opportunities than on the farms. But this is not always true. It is true, however, that a relatively high proportion of the migrants are among the younger members of the rural community. Otherwise, the question of quality of the residual rural population remains unanswered.

The rapid migration to the cities has caused serious problems there as well as on the farms. Nearly all the countries encountered difficulties in maintaining adequate food production, transportation, education, police, health, power, water, and sewerage facilities in urban areas.

The results are seen in serious shortages of city water and electric power, insufficient schools, limping transportation, and other chaotic services as well. The surprising thing is that such services have been maintained as well as they have and, indeed, sometimes improved.

Unfortunately, there are no figures to show the numbers of persons living on farms who are directly dependent on agriculture for their livelihood. The best available information is found in two sets of statistics. One shows the population living in rural places and the other, the numbers of persons economically active in agriculture. Each of these has serious limitations as a measurement of the true number of farm population.

Rural Population

In most countries, rural population refers to persons living in places of less than 2,000. They are, however, variations in definitions from country to country. In Mexico, the dividing line was set at 2,500; in Colombia, 1,500; in Venezuela, 1,000. In Brazil, Chile, and Peru, the distinction is based on the presence or absence of specified urban services such as city water, sewerage service, and street lights.

Even in small towns that are considered rural, the bulk of the population is engaged in activities other than agriculture, although some town inhabitants may operate farms or work on farms nearby. On the other hand, some persons living on farms are employed in nonagricultural activities. A further complication is that many persons divide their time between two or more occupations. Data on these part-time farm workers are either incomplete or are lacking in most countries (12).

Rapid urbanization is an outstanding characteristic of Latin America. From 1950 to 1965, the rural population for 23 republics increased from 97 to 120 million; but the urban growth was from 62 to 120 million, making it equal to the rural population (appendix table 4). The rates of gain were 1.5 percent for rural and 4.6 percent for urban. In Chile and Uruguay, there was no increase in rural population. At the other end of the scale, urbanization occurred at an almost unbelievable rate of 7.6 percent for Honduras and at 6 percent for Costa Rica and Venezuela. Both the total population gains, and the rapid urbanization have produced some serious socioeconomic changes and pressures.

Excess population was both pulled to the cities and pushed out of the farming regions. Many farming areas, especially in the Andean region, were already overpopulated, and productive land was excessively divided. Sons of farmers or of farm laborers, therefore, found little opportunity in their home neighborhoods, except at very low subsistence rates. In the cities, on the other hand, new industries were booming and, although the untrained country boy found employment hard to obtain and wages low, the wages were better than he could have obtained on the farm. In addition, the attraction of city amenities and educational opportunities increased the rate of migration and added to the problems of urban employment.

Despite the overcrowding of agriculture and the resulting great migration to cities, there was still an absolute growth in rural population. This increased by 24 million persons between 1950 and 1965 for the 23 republics, adding more pressure to the overstaffed farms.

Some qualifications must be made to this statement. An extensive analysis would be required to determine just what happened in each classification within each country. As urban population grew, villages became towns and towns became cities. Thus, the places and areas are not exactly the same for the two dates. Things happened to the farms and their population also. With the spreading of cities, much land that was formerly in farms became covered with residences, industrial plants, highways, airports, reservoirs, and so forth.

Population Employed in Agriculture

In the various countries, approximate employment on farms is indicated by census reports of economically active population engaged in agriculture. While such reports come no closer to identifying the number of people living on farms than do the rural-urban

classifications, they provide a better basis for estimating the population directly dependent on agriculture. Even here, however, there are certain defects in the figures. Census figures on numbers of persons economically active in agriculture refer to a specified day. Definitions and interpretations of census terms vary among countries (13). There seem to be no data on numbers of part-time workers nor on number of days that farmers work off their farms.

In their 1960 censuses, 16 Latin American countries for which data were available showed 54 percent of the economically active population (25 million out of 47 million) engaged in agriculture.

Nineteen-sixty census data showed the number of women engaged in agriculture in 16 Latin American countries to be small. In Brazil, Mexico, Paraguay, and Peru, from a fifth to a third of all working women were on farms. In five countries, the proportions were from 10 to 17 percent, and in the other seven countries they were from 3 to 7 percent (app. table 5). There is some uncertainty, however, as to the practices followed by census takers. How many farm housewives were counted as working on farms and how many as engaged in purely domestic pursuits? In addition, the proportionate number of women working varies from season to season, since women are usually employed in relatively light seasonal operations such as picking coffee, cotton, or fruit.

Persons working in agriculture may be divided into three major groups. First, there are the farm operators who are usually classified in census returns as employers or as self-employed workers. In 1950, these amounted to 24 percent of total agricultural labor in Costa Rica, 31 percent in El Salvador, and 33 percent in Argentina. Elsewhere, farm operators comprised from 40 to 60 percent of the total.

Second are the employees or hired help. In Haiti, Panama, and Paraguay, this group numbered only 6 to 10 percent of the total in 1950. In the other countries, it was 30 to 60 percent.

The third group consists of unpaid family workers. These workers usually made up between 10 and 30 percent of the total, except in Haiti where they comprised 48 percent.

Thus, the farm labor force is by no means homogeneous and the figures that represent it are more heterogeneous than the facts. There is the variation already indicated among countries and even more so among farming regions and types of farms. In addition, there are differences in interests among groups. The objective of the farm operators and family workers is to obtain the greatest net return from their individual farms. The interest of the hired workers is somewhat different and consists simply of obtaining the highest possible wages and best possible living conditions, usually without much concern about earnings of the farm as a whole.

Agricultural Employment and Agricultural Efficiency

Development in agricultural technology implies a reduction in proportion of population employed in agriculture. This releases manpower for employment elsewhere such as in manufacturing, commerce, and service activities. Conversely, a high proportion of population in agriculture is evidence of inefficient farming or of structural defects in the economy which prevent full realization of a country's economic potential.

Between 1950 and 1960, the proportion of economically active persons engaged in agriculture declined in Latin America by 2 to 16 percentage points in 11 of the 13 countries for which comparison was possible; in most of these countries the proportion declined by 2 or 3 percent.

The 1960 censuses provided information on economically active population in agriculture for 16 countries. The lowest percentages were 18 for Uruguay, 19 for Argentina, 28 for Chile, and 32 for Venezuela. The highest were 60 to 67 percent for Honduras, Guatemala, Dominican Republic, and El Salvador. In three countries, the percentages were 40 to 49; in five, 50 to 59. The economically active population in agriculture for the 16 countries

ranged from 18 to 67 percent with a modal value of 52 percent. By way of comparison, the economically active population in agriculture in 11 western European countries in 1960 ranged from 11 to 54 percent, with a modal value of 25 percent.

Of course, averages for different countries with differing economic and physical conditions are of very limited significance. Nevertheless, it is interesting that twice as high a proportion of the economically active population is engaged in agriculture in Latin America as in Europe.

In the United States and Great Britain, only 6 or 7 percent of the economically active population has recently been engaged in agriculture. Great Britain, however, imports a large part of its food and raw materials, thus reducing the number of workers on farms.

Farm Income

What are the earnings and living conditions of the population engaged in agriculture and how do these compare with those for other economic sectors?

Comparison of the percentage of gross domestic product (GDP) from agriculture to the percentage of the economically active population engaged in agriculture in the early 1960's gives a rough index of the overall economic condition of the farm population. This is shown below for 14 countries in order of the relative importance of agricultural labor in the respective countries (59, 89):

<u>Country</u>	<u>Economically active population employed in agriculture</u>	<u>Gross domestic product from agriculture</u>
	<u>Percent</u>	<u>Percent</u>
Argentina -----	19	17
Chile -----	28	9
Venezuela -----	32	7
Panama -----	46	24
Costa Rica -----	49	33
Peru -----	50	22
Brazil -----	52	28
Colombia -----	52	32
Mexico -----	54	18
Ecuador -----	56	38
Nicaragua -----	59	37
El Salvador -----	60	31
Guatemala -----	65	31
Honduras -----	67	45

It will be noted that the variance in percentage of employment in agriculture is greater than that in GDP contributed by agriculture. Thus, it appears that a given percentage increase in the population engaged in agriculture is associated with a much smaller increase in the percentage of GDP that comes from agriculture. Principal reasons are the greater efficiency in the use of labor and capital in industry and mining than in farming. Coupled with this are small supplies of capital on farms and the prevailing policy orientation toward industrial and mineral development rather than toward agriculture. It must, of course, be understood that the value of the agricultural contribution to GDP does not represent the remuneration of any specific agricultural group. Out of this portion of GDP comes the earnings of farm operators, farm laborers, and landowners (who may or may not be operators).

Earnings of Farm Laborers

It is difficult to make meaningful comparisons between farm and nonfarm wages. Farm and nonfarm living costs differ markedly. Hours and working conditions are different. The farmworker is frequently paid partly in perquisites which may include the use of a house of sorts plus farm-raised produce for food. The perquisites are very hard to evaluate and are not always included in farm wage studies. Prices at the farm are lower than those that would be paid for the same things in the cities. Also, there is a wide variation in the earnings of farm laborers. This is affected by the location, type of farming, and nature of the tasks, and by whether any managerial responsibility is involved, as well as by the number of days or months of employment in the year. Seasonal employment seems more pronounced for farm labor.

A few figures on wages for farms and for other industrial groups are available (57). Where comparisons could be made, the rates quoted for wages in manufacturing run from 1.4 to 3.9 times as high as those for farmworkers. In some cases, however, there may be a tendency to confuse the legal minimum rates of farm wages with those actually paid. In rural districts, legal provisions concerning wages and laboring conditions are frequently disregarded, and, in addition, there is the problem already mentioned of placing correct valuations on the perquisites. With the surplus of available workers in rural districts, especially in the Andean region, some skepticism is justified regarding some of the higher farm wage rates that are reported officially.

Comparisons of the distribution of wages, including perquisites, according to income levels of the farm and nonfarm population indicate much lower rates for agriculture. This is true of Brazil as indicated below (7, 8, and 18):

<u>Average monthly earnings of hired laborers</u>			<u>Percentage of hired laborers in--</u>		
<u>Cruzeiros</u>	<u>Dollars</u>	<u>Agriculture and extractive industries</u>	<u>Other industry¹</u>	<u>Other employment¹</u>	
			Percent		
0 - 2,100	0 - \$10.24	32.5	6.4	8.1	
2,101 - 3,300	10.25 - 16.10	26.1	9.2	7.6	
3,301 - 4,500	16.11 - 21.95	17.7	11.3	8.9	
4,501 - 6,000	21.96 - 29.27	11.8	25.2	18.5	
6,001 - 10,000	29.28 - 48.78	8.0	30.0	28.2	
10,001 - 20,000	48.79 - 97.56	3.0	13.4	19.9	
Over - 20,001	Over - 97.57	0.9	4.5	8.8	

¹Omitting persons without income or with income undeclared, numbers of wage earners were estimated as follows in millions: Agriculture and extractive industries, 8.5; other industry, 2.3; other types of employment, 5.0.

Among the agricultural laborers, 32 percent received an average of less than \$10.25 a month and another 26 percent received \$10.25 through \$16.10. Eighty-eight percent averaged less than the equivalent of \$29.28 a month. In contrast, 48 percent of the wage earners in manufacturing and 57 percent of those in other urban activities averaged \$29.28 or more.

Earnings of women were considerably lower than of men. According to the Brazilian census, 81 percent of the women working in agriculture or other extractive activities, 45 percent of those in manufacturing, and 59 percent in other activities averaged less than the equivalent of \$16.11 a month.

The distribution of 1961 rural and urban wages in Peru is similar to that for Brazil (68):

<u>Weekly earnings</u>	<u>Annual earnings</u>	<u>Rural laborers</u> ¹	<u>Urban wage earners</u> ¹
<u>Soles</u>	<u>Dollars</u>	<u>Percent</u>	
0 - 50	0 - \$97	20.1	5.9
50 - 100	97 - 194	34.4	15.4
100 - 200	194 - 388	35.1	32.8
200 - 500	388 - 970	9.9	41.3
500 - 1,000	970 - 1,940	0.4	4.2
Over 1,000	Over 1,940	0.1	0.4

¹Includes the following numbers of wage earners: Rural, 370,000; urban, 461,000.

Corresponding figures show that in 1961 one-fifth of the farm laborers of Peru were earning not over \$97 a year; 54 percent, not over \$194; and 90 percent, not over \$388. On the other hand, 46 percent of the urban laborers earned above \$388 a year, and 78 percent, above \$194.

Income of Farm Operators

There is even less information on the income of farm operators than on that for farm laborers. Net farm income is affected by the size of the farm, the crop and livestock organization, the technical methods, the economic structure, managerial methods, and, especially, by the ability of the farmer. The combinations of these influences, however, are very complex and consequently difficult to analyze. The farm management studies needed to arrive at clear explanations of these variations have been made in only a few areas, and mass data on farmer's income levels are not available.

For the very small farms, income is usually extremely low, as might be expected. On the larger farms, operators frequently receive what would be considered satisfactory income in almost any agricultural community. These levels and variations are illustrated in the following estimates from the CIDA case study of land tenure in the Roldanillo area of the Cauca valley in Colombia for crop year 1961-62 (66, 73):

<u>Farm size groups</u>		<u>Farms</u>	<u>Average net family income</u>
<u>Plazas</u> ¹	<u>Acres</u>	<u>Number</u>	<u>Dollars</u>
0 - 1.5	0 - 2.4	22	57
1.6 - 7.5	2.5 - 11.9	48	212
7.6 - 15	12.0 - 23.7	12	350
15.1 - 30	23.8 - 47.4	7	736
30.1 - 75	47.5 - 118.5	5	3,225
75.1 - 150	118.6 - 237.0	4	2,175
Over 150	Over 237	2	11,524

¹1 Plaza is equal to 0.64 hectares or 1.60 acres.

The variation in net farm income and in net family income in Peru is illustrated by estimates from the CIDA land tenure study for that country (appendix table 6). In this study, farms were divided on the basis of area into four main groups:

1. Subfamily farms (those usually incapable of supporting a family). Less than 3 hectares in the coastal regions, less than 3 hectares of irrigated land or 10 hectares of dry land in the sierra, up to 10 hectares in the high selva, or up to 20 hectares in the low selva.

2. Family farms (those usually capable of supporting a family). 3 to 10 hectares on the coast and in the sierra, 10 to 50 hectares in the dry sierra, 10 to 20 hectares in the high selva, and 20 to 100 hectares in the low selva.

3. Medium-sized multifamily farm. Larger than family farms and usually employing up to about a dozen laborers.

4. Large multifamily farms. Larger and employing more labor than medium-sized multifamily farms with laborers sometimes in excess of 100.

It will be noted that in each of the areas studied, the large multifamily farms realized net farm incomes of over \$10,000 equivalent. On the coast, the large multifamily farms were specialized and usually produced sugarcane, cotton, or rice. In the selva (new, unsettled areas) they produced coffee or other intensive crops. In the sierra (mountains or rough land), such farms produced cattle, sheep, wheat, potatoes, barley, or dairy products.

The medium-sized, multifamily farms seemed to have about the same products as the larger ones. The same was true of the family farms, except that the smaller farms had a more intensive crop and livestock structure and a higher value of produce per hectare.

Despite the relatively small areas actually farmed, the medium-sized multifamily farms included in the CIDA case studies averaged net incomes of around \$3,000. Family farms received net farm incomes of \$600 to \$1,000 a farm. Family farmers, however, found considerable employment off their own farms, thus adding 10 to 20 percent to their incomes. In the subfamily group, the proportion of income obtained from outside employment rose still further to about a third of the total, but the total family income averaged only \$269 in the sierra, \$443 in the selva, and \$529 in the coastal region.

Among the farm laborers and the communal groups included in the study, in the sierra, total income was smaller still and consisted chiefly of wages obtained from employment outside the small land holdings.

Peruvian farm laborers often earned a few hundred soles from small patches of land owned or rented, but total average income for the year equaled only \$170 in the sierra, \$241 in the selva, and \$333 in the coastal region.

Labor Productivity and Earnings

Returns to the combined factors of production cannot, of course, be greater than the value of the product. The proportions of total returns that go to land, labor, and capital, however, can vary widely, depending on the relative supplies of these factors, alternative demands for them, natural and technological limitations, and other things.

In Latin America there is a large supply of farm labor, capital is scarce, and much of the land is mediocre. In addition, production methods are often antiquated and inefficient. All of these influences affect labor earnings. With ineffective methods and poor farm management, labor productivity and earnings are low.

Wide regional variations are found in amounts of labor used per hectare in growing a crop. The situation is illustrated by a few examples of rates of labor input and of production per hectare and per man-hour for corn and wheat. Recent estimates for corn are as follows (93, 94, and 38):

Country, area, and type of farming	Man-days per hectare	Kilograms per hectare	Kilograms per man-day
	<u>Man-days</u>	<u>Kilograms</u>	<u>Kilograms</u>
Argentina:			
National average -----	8.2	1,760	215
Pergamino area -----	8.2	3,000	366
Brazil, Rio Grande do Sul:			
Large, mechanized farms -	10.1	1,048	104
Small farms -----	30.1	1,675	56
Brazil, Minas Gerais:			
Small farms -----	40.0	1,062	27

Country, area, and type of farming	Man-days per hectare	Kilograms per hectare	Kilograms per man-day
	Man-days	Kilograms	Kilograms
Mexico:			
By hand-----	54.2	1,000	19
With oxen-----	37.3	1,000	27.27
With mules-----	32.1	1,000	31
Paraguay:			
With oxen-----	38.0	1,280	34

In Argentina, with large farm units and fairly good management, an estimated total of 8.2 eight-hour days were spent in raising a hectare of corn during the early 1960's. With an average yield of 1.8 tons per hectare, this meant a production of 215 kilograms of corn per man-day. But yield is also important. Yields of 3 tons per hectare in the highly productive Pergamino area raised the product there to 366 kilograms per man-day.

On large, well-equipped farms in the state of Rio Grande do Sul in southern Brazil, 10.1 man-days were spent in producing a yield of 1,048 kilograms, or 104 kilograms of corn per man-day. On a group of small farms in the same state, 30.1 man-days were used per hectare; but the high labor input was partly compensated by a higher yield of 1,675 kilograms of grain per hectare, or 56 kilograms per man-day.

Similar low yields and high labor inputs were found as a general rule among small farms elsewhere, especially in newly settled areas of Paraguay. In these areas, the production per man-day most commonly ran from 20 to 30 kilograms of corn, not far from 1 bushel produced per man-day. It is likely that the efficiency of labor used has improved on the large, well-managed farms since the estimates were obtained. But on most of the very small farms, it is unlikely that much improvement has occurred.

Comparisons with performance in the United States would not be meaningful, in most cases. Nevertheless, it is desirable to have a basis for reference. In surveys made by the U.S. Department of Agriculture during 1949 and 1950, the labor input in producing corn was 2 to 5 man-days per hectare in the Corn Belt States and 7 to 10 man-days in the Pennsylvania-Virginia-North Carolina region. Yields were 2 to 4 tons a hectare. Thus, corn production per man-day was 300 or 400 kilograms in the eastern States and from 600 to 1,200 kilograms in the Corn Belt States, but was over 1,500 kilograms in an area in southeastern Nebraska where the corn was lister-planted (soil prepared and planted in a single operation).

In the production of wheat during the 1950's, variations in labor input and in the productivity of labor among areas were similar to those for corn. Illustrative figures are as follows (63, 64, 67):

Country, area, type of farm or farming method	Man-days per hectare	Kilograms per hectare	Kilograms per man-day
	Man-days	Kilograms	Kilograms
Argentina (Pampas, grain farms):			
Argentina estimates-----	1.75	1,300	743
ECLA estimates-----	3.10	1,023	330
Brazil (Rio Grande do Sul):			
Large, mechanized farms--	2.60	900	346
Small farms-----	23.0	900	39
Mexico:			
Aguascalientes and Queretaro			
with mules-----	15.3	2,000	131
Sonora with tractors-----	5.8	2,000	345
Zacatecas with tractors---	13.3	2,000	150
Hidalgo partly with tractors-	26.1	2,500	96
Peru:			
Large holdings (fundos)			
in the sierra by hand----	76.0	1,964	24

Production of wheat per man-day in Argentina and on large mechanized farms in southern Brazil ran around 350 kilograms according to ECLA studies in those areas and also where a tractor was used in Sonora. With mules or with less complete use of tractor, labor productivity was lower and amounted to only 96 to 131 kilograms per man-day in Mexico. Where the crop was planted and harvested largely or entirely by hand in Brazil and Peru, the production per man-day was around 30 kilograms, or about a bushel.

In the United States, the 1949 and 1950 surveys previously referred to showed that wheat production per man-day (8 hours) amounted to 200 to 500 kilograms in the Pennsylvania-Virginia-Tennessee area and 700 to 1,200 kilograms in the midwest States.

Efficiency in the use of labor in crop production is not the sole determinant of high or low farm income. But it is a very important intermediate influence determined by size of the respective farm units, amounts of land in crops rather than pasture, types and sizes of motive power units, capacity of tillage implements on the farm, organization of the farm labor force, and efficiency with which it is directed. Output of crop per man-day is affected, of course, by whatever determines crop yields.

Despite its limitations, output per man-day is one convenient measure of overall efficiency of the technological process, including the internal organization of the farm. And it is highly important in indicating one of the principal limitations on earnings of the labor after allowance for costs of seed, fertilizer, capital, and land. Where the gross product amounts to only a bushel of corn or of wheat for each man-day worked, there is not much potential income for farmer or hired man even before allowance is made for these deductions. The important fact here is that in most parts of Latin America, the rates of productivity that characterize the use of labor on nearly all of the smaller farms and some of the larger ones are very low.

Living Conditions

In an area of generally agreeable climate and plentiful and cheap labor, living conditions for the many thousands of successful, large-scale farmers in Latin America are probably as pleasant as in any part of the world. There are, of course, some exceptions to these conditions, such as the tendencies of governments to officially favor agriculture but to grant preferential treatment to urban industries, quite often at the expense of the farmers. Even so, the energetic and intelligent farmer with at least a moderate amount of capital has many economic opportunities.

To the farm labor class and to the minifundista, however, the situation looks very different and life is by no means easy. There are many more of the low income farmers than there are of the more successful ones. In many areas, especially in the Andean region, population has increased to such a degree that rural labor is superabundant. Wages are consequently at a low subsistence level. The man who owns no land, or who has only a very small plot, is forced to look for work on nearby large farms and to take what he can get in competition with many others like him.

In addition to the usual farmowners, renters, and laborers, is the large group of laborers and minifundistas permanently attached or semiattached to the large farms.

These *inquilinos*, *huasipungueros*, and *yanaconas* do not make highly efficient workers; at least this is the point of view of the operators of large farms. Their numbers are increasing, however, and their dismissal is opposed both by themselves and by the government in many instances. The problem of what to do with them is causing more and more concern.

In the sierras of Ecuador as well as elsewhere, large farm operators are trying by various means to get rid of as many attached or semiattached workers as they can. This may include transforming them into renters, taking over their land upon their death, failing to pay as large money wages as formerly, buying out their rights, or giving them parcels of land to get them to sever their connections with farms where they have been employed.

Living conditions for attached or semiattached workers differ widely from farm to farm, depending on the inclinations of the farm owner or patron. Although the families often include 5 or 6 members, the house in Guatemala commonly consists of one room. Floors are most often of dirt, rarely of cement, tile, or brick. Walls are usually of adobe, wattle and daub, that is interlaced poles plastered over with clay or mud. Stone may be used for walls in areas where it is plentiful. The house may or may not have a window. Roofs are usually of thatch or of galvanized iron. Very seldom is there running water in the house. There is rarely any sanitary facility either within the house or outside. Construction of privies would be a long step forward, both in convenience and, more importantly, in the control of widely prevalent and debilitating parasitic infestations, such as the hookworm or amoeba. Conditions are similar in Colombia, Ecuador, and Peru.

The inquilinos of Chile resemble the yanaconas and the huasipungueros in that they are, in effect, attached to the large farms. The inquilinos, however, have acquired a legal status which gives them considerable protection and makes it difficult for the owner of the farm to get rid of them. They are, in turn, required to stay on the farm throughout the year and to work for a stated number of days or to provide substitutes to do their required work. For their work, they receive a small wage and the use of an area of land plus a house to live in. The inquilino's position is considerably better than that of the yanacona. Inquilinos comprise some 25 or 30 percent of the farm labor force of central Chile. They operate about 10 percent of the tilled land, produce 35 to 40 percent of the maize and beans, and have some 15 percent of the cattle and 30 percent of the hogs.

The houses furnished to inquilinos commonly have three or even four rooms, compared with those of their less-favored counterparts in the Andean region. Houses are usually built of adobe but sometimes of brick with floors of dirt, tile, or brick. In a small percentage of cases, the houses have running water. Nevertheless, the general living and sanitary conditions are seriously deficient. Housing for the hired laborers on farms and for the owners of minifundia appear to be about the same as for the inquilinos.

In Latin America, living conditions are usually poorest for the unattached farmworker. They are somewhat better for the minifundistas, yanaconas, and huasipungueros who are attached to the land, although they may vary widely for these workers too.

The owners of very small farms and the laborers attached to large farms are frequently able to leave their holdings and migrate during the slack season to other regions of their respective countries to obtain seasonal employment and then return to their holdings. The laborer without a holding has no place to which he can return unless he is a son or other close relative of an owner, or at least of a holder of land.

Housing of farm operators on medium or large farms is, of course, much better than that of the minifundistas and laborers. Better housing is also provided for farm managers, foremen, white collar workers on large farms, and for skilled workers such as tractor operators.

It should be pointed out that the full standards for urban housing should not be applied to scattered houses on farms. Building materials and methods that would not be accepted in cities might be satisfactory in farming areas provided there are sanitary facilities, adequate space per person, ventilation, and light. Unfortunately, an understanding of sanitation and the relationship between housing and health is commonly absent, and the essentials for sanitation are all too often lacking--even in many cases where they could be provided without great additional expense or trouble (71, 72, 73, 74).

Food Habits

Food consumption in Latin America tends to run strongly toward carbohydrates with restricted amounts of protein or of protective foods. Exceptions are found in Argentina and in Uruguay. In those countries, with the heavy production of cattle and sheep, there is the highest consumption of meat in the region and also the greatest intake of carbohydrates

and fats. Elsewhere, the principal foods are maize, rice, cassava, potatoes, sweetpotatoes, and wheat and barley, with bananas and plantains in the tropical and subtropical countries.

Average food supplies estimated to be available at retail level for consumption in 23 Latin American republics in 1959-61 exceeded minimum standards published by U.S. Department of Agriculture (95). Daily per capita food consumption on this basis in this period, with standards in parentheses, was as follows: Calories, 2,570 (2,555); protein, 66 grams (60); and fat, 60 grams (43). However, food supplies are not well distributed, and considerable evidence points to widespread undernourishment (insufficient calorie intake) and malnutrition (diet imbalance), particularly for low-income and rural groups.

Per capita consumption of cereals and starchy roots in Canada and the United States amounted to 802 and 763 calories a day, respectively, in 1959-61. In contrast, per capita consumption of cereals and starchy roots was over 1,000 calories a day in those Latin American countries with the lowest consumption of carbohydrates. In eight countries it was above 1,400 calories a day.

Various kinds of beans were widely used and provided a part of the protein. As a quick-energy food, sugar was consumed rather liberally in several countries, often as brown loaf sugar.

Consumption of sugar was above 500 calories per capita per day in Colombia, Costa Rica, and Cuba, compared with 502 calories for the United States and 503 calories for Canada. On the other hand, in Bolivia, Haiti, and Paraguay, intake of sugar amounted to less than 200 calories, and averaged 375 calories for the 23 Latin American countries listed in appendix table 1.

Consumption of fats was especially low in these 23 Latin American countries. The average was only 60 grams per capita per day, compared with 146 in the United States and 140 in Canada. Fat consumption was below 40 grams per day in Bolivia, Ecuador, Guatemala, Haiti, and Peru.

The intake of proteins was 66 grams per capita per day in the 23 republics, compared with 95 grams for the United States. As mentioned, there was relatively high protein consumption in Argentina and Uruguay. Elsewhere, it was around 60 grams, except in Dominican Republic, Haiti, and Peru where deficiencies were marked.

National average estimates often give little idea of the diet of people living on farms. These people have lower average incomes than urban people, however, and it seems safe to conclude that the farm diet is even more deficient than urban as a general rule. This is especially true of the farm labor group and the minifundistas. Operators of the larger farms usually have a much better diet, as do the higher income groups in the cities. Unfortunately, there have been but few comprehensive studies of rural diet.

Some information is available from the CIDA studies of land tenure. In the study in Guatemala, a typical diet for a week for a family of five in the highlands was as follows: Maize, 11 kilograms; brown sugar, beans, and broad beans, 1 kilogram each; rice, meat, and coffee, 0.5 kilograms each; chili peppers, 113 grams; salt, 0.2 kilograms; and various vegetables (70).

A similar study in Peru found that among minifundistas in the upland or sierra region a common diet consisted chiefly of wheat in a stew or soup, potatoes, maize, and a tea made of herbs. In the newly settled areas east of the Andes and at lower altitude, yuca, plantains, rice, beans, bread, and coffee were standard articles of food (71, 73, 74, 95).

Even in typical meals of successful farm families in lower or middle-altitude areas of Colombia, the preponderance of starchy foods is almost as great as with the low-income groups. A "company" dinner might consist of rice, yuca, potatoes or sweetpotatoes, fried plantains, and coffee with the protein supplied by a small portion of chicken. There might also be some form of cornbread. Such families, however, often have some form of fruit for dessert, perhaps bananas (another starchy food), or sometimes oranges.

Thus, unbalanced diet is not entirely a matter of income. It is a safe rule, however, that the amount of the more expensive foods, such as meat, will vary with the level of

income. But there are a number of other important considerations. Among them are questions of ecology and relative costs of the various foods, especially of local products. There is also the matter of dietary custom which has spread from family to family, and food habits which have come down from generation to generation.

EDUCATION OF FARM PEOPLE

Universal elementary education is essential in increasing Latin American farm production and farmers' income. Secondary and higher education are also important, although they are attainable for only a small percentage of the farm public. It was widespread education and an active search for improved methods that provided the foundation for the great upsurge in production and farm welfare in the United States during the past half century.

Latin America is less fortunate in that the demand for universal education has not yet been effective. Among the minifundistas and the farm laborers, there is in most countries no tradition of popular education to look back to, and hence but little urge to demand such advantages. This has been a hinderance to development of effective systems of secondary schools, vocational agricultural training, and higher education.

Literacy of Farm People

The current complexities of practical farming may be attributed partly to the developing technology and partly to the wide diversity of natural and economic conditions under which the farmer must operate. The farmer's objective is to maximize his net income. In achieving this end, the traditional methods learned from his father no longer provide a safe guide. The farmer must now be something of a scientist and an engineer, and this requires far more education than was needed by his father.

With the farm labor group, education is not quite so essential. But laborers have a different sort of need. With overpopulation and resulting low wages in many areas, the only way for many laborers to improve their condition is to move into urban occupations. There they will be at an extreme disadvantage unless they can at least read and write and understand the techniques that they must use.

Variations Among Countries

There are no comprehensive data on the literacy of the Latin American farm population. The best available information is supplied by census figures comparing rural and urban areas.

These data, however, do not satisfy the requirements. First, literacy is differently defined in various countries, and figures on literacy are not given for the same age groups in all countries. Second, as we have already seen, census definitions of rural and urban population correspond only approximately to farm and nonfarm population. For example, in census definitions the term "rural" refers to places of less than 2,000 population in most countries, but there are a few exceptions. The line between rural and urban is drawn at 2,500 in Mexico, 1,500 in Colombia, 1,000 in Venezuela, and, in a few countries, depends on whether there are certain city services.

Estimates are available on literacy for only 16 countries for 1960. Four countries stood out above the rest: Argentina, Chile, Costa Rica, and Uruguay, all of which reported that more than 80 percent of their total population could read and write. In Panama, literacy was 77 percent; in Brazil, Colombia, Ecuador, Mexico, Peru, and Venezuela, 60 to 70 percent; in the Dominican Republic, 56 percent; in El Salvador, Honduras, and Nicaragua, 40 to 50 percent; and in Guatemala, 37 percent.

Data from the 1950 censuses showed literacy in Paraguay to be 66 percent; in Bolivia, 32 percent; and Haiti, only 10 percent. These rates have probably improved since 1950.

The rates of literacy for persons 15 years or older are shown below for rural and urban areas in 13 countries, according to censuses between 1960 and 1964 (62):

<u>Country</u>	<u>Rural</u>	<u>Urban</u>
	<u>Percent</u>	
Chile -----	66	91
Colombia -----	51	80
Costa Rica -----	78	94
Ecuador -----	56	88
El Salvador -----	34	72
Guatemala -----	23	65
Honduras -----	35	74
Mexico -----	51	79
Nicaragua -----	30	79
Panama -----	62	93
Peru -----	41	82
Uruguay -----	84	93
Venezuela -----	37	79

Except for Costa Rica and Uruguay, the rate of literacy in rural areas was 25 to 40 percentage points below that reported for the urban areas. This, however, understates the actual difference. The small towns included within the rural areas usually contain schools. In the open country, there are few schools. Consequently, but few of those farm children who live beyond walking distance of town schools have an opportunity to obtain formal education. Hence, the percentages given for rural areas fail to show the extent of literacy of the actual farm population.

Considerable progress was made between 1950 and 1960 in building schools and increasing the number of pupils in them. Most of the advantages, however, went to the cities and towns. In those countries for which data were available for both 1950 and 1960, literacy increased from 5 to 14 percent. Venezuela lead with an increase from 51 percent in 1950 to 65 percent in 1960, followed by Brazil where literacy rose from approximately 50 percent in 1950 to 62 percent in 1960.

Depth of Literacy

Two separate questions should be raised concerning elementary schooling. The first is: What proportion of a given population has had any schooling at all? This may be called the breadth of education. The second question refers to depth of education: How many years has the pupil attended school, and how far has he advanced?

Accurate and comparable data on the proportion of the farm population attending school is scarce. However, Brazil provides an example (9, 10). A school census taken in 1964 showed that 66 percent of Brazilian children between 7 and 14 years were attending school. The data were classified into rural and urban totals. For the urban areas, the percentage in schools was 81, compared with 51 for rural. Also, the school attendance varied considerably among different regions. In the northeast, 80 percent of the urban children were in school, compared with 39 percent of rural children. In the southern part of the country, the respective figures were 82 and 63; in this area, a large part of the population came from European countries with a tradition of universal education. The school census did not include all states and territories. Furthermore, it is probable that omissions in the census of children not in school were higher in the rural districts than in the cities. Also, the proportion of farm children who do not attend school is likely to be higher than figures shown for all rural children.

In searching for an answer to the second question, on depth of education, we must depend largely on census data which show the approximate proportions for rural and urban regions rather than on any precise figures for farm and nonfarm populations.

Among 18 countries for which recent data are available, two reported that as many as 40 percent of their pupils who entered the first grade stayed in school until they reached the sixth grade (appendix table 7). In three countries, 30 to 39 percent of the first grade pupils reached sixth grade. In four countries the percentage was 20 to 29; in five countries, it was 10 to 19; and in two countries, it was less than 10.

In Bolivia, 6 percent of the urban pupils entered sixth grade, but there are no data for the rural schools. In Colombia, the sixth grade is counted in the secondary school curriculum. In that country, 20 percent of the pupils entering the first grade reached the fifth grade, and probably 15 or 16 percent finally entered the sixth grade.

An effort was made to reach some general conclusions concerning primary schooling for farm children in the Latin American region as a whole. This was successful only on certain broad questions. Laws and customs differ from one country to another. Certain conclusions can be reached partly from published figures and partly from general information.

It is evident that the children from farms have fewer educational opportunities than those from cities or towns. It is evident also that the country children stay in school for shorter periods than do city children and that the dropout rates both for city and country are very high.

Figures, somewhat incomplete, are published in most countries and summarized in IASI's *America en Cifras* for 1963 and 1965 (56, 57). Two facts stand out. One is that progress is actually being made in extending educational opportunities to larger numbers of children in each country. The other is that there is a high prevailing rate of dropout over the entire region.

For 18 countries for which data are available, primary school attendance increased by 79 percent, from 16.4 million pupils in 1955 to 29.4 million in 1964. This is a growth rate of about 6 percent a year, or twice as great as that for the total population.

For the 9 years, from 1955 to 1964, primary school attendance increased 14 percent in Uruguay, 17 percent in Argentina, 31 percent in Paraguay, and 40 to 60 percent in the Dominican Republic, Chile, and Bolivia. At the other extreme, the greatest increase was in Brazil and amounted to 125 percent. Other increases of 100 percent or more in primary enrollment occurred in Honduras, Nicaragua, and Venezuela.

The proportion of children attending primary school was much higher in urban than in rural districts, as is shown by the tabulation below. There were only 11 countries for which all the figures needed for a comparison were available, but these tell a consistent story. Ratios for urban, compared with rural districts, show that a much higher proportion of town children than of rural children are in primary school. For each 100 members of the urban population in these 11 countries, there were 21.5 children in primary schools, and in the rural districts, there were only 11.8 children in primary schools. In only one of the 11 countries shown in the tabulation was the proportion somewhat higher for country than for city schools. The number of pupils in primary schools for each 100 of the entire population, according to census data of 1961-65, was as follows:

Country	Urban areas	Rural areas
Honduras -----	28.0	10.2
Paraguay -----	27.7	13.0
El Salvador -----	27.0	7.6
Costa Rica -----	23.4	16.5
Uruguay -----	21.7	12.6
Venezuela -----	21.6	13.6
Peru -----	18.6	11.0
Ecuador -----	17.9	11.2
Brazil -----	17.8	9.3
Panama -----	17.5	18.9
Guatemala -----	16.0	5.5

In addition, in the countries where only three or four grades are taught in rural schools, farm children, if they are to continue to live at home, cannot enter secondary schools. This, of course, blocks their admission to advanced technical schools or to universities. The only way this impediment can be overcome is for parents to send a child to live in a town where more advanced schooling is offered. This is beyond the resources of the ordinary small farmer or rural laborer.

The 1961 census for Venezuela shows the number of years of schooling completed by persons 15 years or older who were reported as literate for 1,478,000 urban and suburban persons and 340,000 rural persons. These figures, expressed as percentages of the respective totals, were as follows (98):

Category	Total ¹	1st grade	2d grade	3d grade	4th grade	5th grade	6th grade
----- Percent -----							
Urban and suburban -----	100	6	13	18	20	12	30
Rural-----	100	13	27	30	15	5	9

¹Percentages may not add to 100 due to rounding.

Brazilian statistics for 1963 permit a separation of primary school enrollment for state capitals (usually the largest cities) and for all other places. The latter, of course, include all small towns, and school attendance in them is much higher than in farming regions. The number of pupils in the state capitals was approximately 2.0 million, compared with 8.0 million elsewhere. Enrollment for each grade expressed as the nearest percentage of the first grade enrollment was as follows (6, 9, 10):

Category	1st grade	2d grade	3d grade	4th grade	5th grade	6th grade
----- Percent -----						
In state capitals -----	100	63	52	44	20	9
Outside capitals -----	100	38	27	17	5	0.1

Dropouts between first and second grade amounted to 37 percent in the state capitals and 62 percent elsewhere. Rural schools in Brazil seldom offered more than four grades and often only three. Pupils in the fifth grade in the capitals numbered 20 percent of those in the first grade, and those outside the capitals, only 5 percent. Virtually no pupils outside the capitals completed sixth grade and were qualified to attend more advanced schools.

Other evidence of the deficiency of rural education in Latin America is fragmentary but convincing. A comparison may be made between urban and rural places for Colombia, Guatemala, Honduras, and Mexico. Enrollment in each grade as a percentage of first grade enrollment in the year indicated was (17, 71, 75, 76):

Country	Category	1st grade	2d grade	3d grade	4th grade	5th grade	6th grade
Colombia (1963)	Urban	100	70	56	42	32	n.a.
	Rural	100	49	11	4	1.6	n.a.
Guatemala (1959)	Urban	100	53	44	35	26	19
	Rural	100	34	10	2	1	0
Honduras (1956-58)	Urban	100	55	43	34	25	17
	Rural	100	33	11	1	1	0
Mexico (1958)	Urban	100	68	59	50	44	38
	Rural	100	40	20	8	3	2

From half to two-thirds of the rural pupils in these four countries dropped out at the end of the first grade. Rural enrollment in the third grade was only 20 percent of the first grade enrollment in Mexico and about 10 percent in the other three countries; in the fifth grade, enrollment in the four countries was only 1 to 3 percent of the first grade enrollment.

In Ecuador, the following percentages of rural pupils enrolled in first grade in 1956-57 attended classes in the subsequent grades (19):

<u>1st</u> <u>grade</u>	<u>2d</u> <u>grade</u>	<u>3d</u> <u>grade</u>	<u>4th</u> <u>grade</u>	<u>5th</u> <u>grade</u>	<u>6th</u> <u>grade</u>	<u>completed</u> <u>6th grade</u>
100	50	37	22	11	7.5	5.4

It should be remembered that the curriculum in Latin American schools does not correspond to that in the United States. In Mexico, for example, there are 6 years in primary school, 3 in secondary, and 3 in preparatory courses. Preparatory courses are chiefly for students who wish to go to a university. It is evident, however, that farm children, except in three or four countries and in a few favored locations or situations elsewhere, either receive less education than any other group, or else receive no education at all. Unless they happen to live near towns or move to town for schooling, such children have no opportunity to complete primary school. Consequently, efforts to improve university training in agriculture are virtually meaningless so far as a large part of the farm population is concerned. The full significance of this fact for farm technology and for rural leadership can only be conjectured.

The lack of education is the chief reason for backwardness of Latin American agriculture. This is a structural defect in the social, hence in the economic, organization that very little has been done to correct. There is little point in talking about development of a modern agriculture unless something is done to raise the educational level of the farm population.

Rural education is equally important to those young people who must move to the towns to find work. Without schooling, such people can obtain only the lowest paid, unskilled employment in the city. Low educational levels in rural areas restrict mobility and add to unemployment problems.

Secondary Schools

Most of the Latin American countries have at least some secondary schools devoted to agriculture. Of these, one of the most effective has been the agricultural school at El Zamorano, Honduras. This was founded by the United Fruit Company and has been in operation since 1943. At this school, the training period lasts 3 years, and courses are offered in agronomy, animal husbandry, horticulture, and science. The original intention was to train farmers and farm administrators. There has been a tendency, however, for graduates to find employment in the lower ranks of extension agencies and in other government work.

Few other schools in vocational agriculture seem to have clearcut objectives and well-organized curricula. Most admit students with lower qualifications than does El Zamorano. At most of these schools, after a course, usually lasting 3 years, students are graduated with various nonacademic degrees (degrees of less than university level). The degree may be "agronomo" (agronomist), "perito" (expert agriculturist), or simply "practico" (practical agriculturist).

In Colombia, there were reported in 1962 to be about 40 vocational schools of agriculture with 2,873 students, plus 41 courses of training for adults, with 5,245 students. In Chile, there were institutes of rural education offering 3-month or 6-month courses

with over 2,000 in attendance. In Paraguay, after about 1940, five schools offering non-university courses were started by the ministry of agriculture, and there were also three private schools started.

In Bolivia, in 1962, there were technical or nonuniversity schools with about 450 students. In Ecuador, there were four such schools. In Venezuela, seven schools for nonacademic agriculturists and two for home economics demonstration agents had a combined enrollment of about 1,100.

The small number of vocational schools and the scarcity of high school or secondary school courses in agriculture together with the very low percentages of farm boys completing even the fourth grade in primary schools make technical training even at the level of the secondary school virtually beyond the reach of most of the farm population.

It has been pointed out that in most Latin American countries 50 to 60 percent of the economically active population is engaged in agriculture. Lowest percentages occur in Argentina, Chile, and Venezuela which have 18 to 30 percent; highest are in Bolivia, Haiti, and Honduras which have 70 to 80 percent.

Considering these high percentages, it is surprising how limited are the facilities for secondary and vocational education in agriculture. In 1961 or 1962, there were reported to be some 1.7 million men and 1.6 million women enrolled in secondary schools in 13 Latin American countries (51). Of these, roughly 1.1 million and 900,000, respectively, were in general secondary schools; 50,000 men and 290,000 women were in normal schools; and 540,000 men and 425,000 women were in vocational schools. Of those enrolled in vocational schools, however, only about 18,000 men and 2,000 women were enrolled in schools of vocational agriculture.

Higher Education

All but two of the Latin American republics have one or more colleges of agriculture at a university level. These are nearly always organized around the subject of agronomy and seldom give much attention to social sciences. The courses are, however, broader than would be offered in agronomy in U.S. land-grant colleges (13, 17, 16).

Schools of Higher Education and Their Needs

In 1962, the CIDA Inventory study found 54 such schools of higher education (superior schools). Full information was not obtained on numbers of students, but there were apparently between 7,000 and 8,000 with 1,200 to 1,400 graduates a year. A related type of institution is the facultad of veterinary medicine, of which there were reported to be 25 in 1962.

It is the responsibility of these schools to train the professionals needed to develop agricultural programs and to put them into effect. In a certain sense, the professors and students in these schools are the elite of agriculture. Graduates comprise the bulk of the personnel found in agricultural research, extension work, and university teaching. All of these services have been limited in the past by a scarcity of trained personnel or by inadequate training of the personnel available. Since professionals must be trained in the specific fields of knowledge required, an entomologist cannot be substituted for a soils chemist nor a geneticist for an irrigation engineer. The numbers of both agronomists and veterinarians being graduated are inadequate.

As may be expected, the standards and qualities of teaching vary widely in the undergraduate courses. Few post-graduate courses are offered except at the Schools of Agronomy at Monterey and Chapingo in Mexico which now offer such courses in a limited number of subjects. This is also true of the corresponding colleges of agronomy at La Molina in Peru, the University of Buenos Aires, the University of Chile, the

Catholic University at Santiago, the University of Minas Gerais at Vicosa, and one or two other Brazilian facultades. There is, however, no broad graduate curriculum in agriculture. The nearest approach is made by the Inter-American Institute of Agricultural Science at Turrialba, Costa Rica which offers training in subjects related to crop and livestock production under tropical conditions.

Estimates of numbers of agronomists in 19 Latin American countries during 1957-61 show about 17,000 in all (46, 17, 49). Brazil led with about 4,500, followed by Mexico with 3,600, Argentina with 3,500, Chile with 1,700, and Peru with 1,500. This left approximately 3,000 in the remaining 14 countries.

Costa Rica was best provided with ingenieros agronomos (agricultural engineers) among 17 countries for which comparisons could be made, based on the CIDA Inventory study. (Actually, the ingeniero agronomo corresponds more nearly with a U.S. college graduate in the field of agriculture, that is, an agronomist, than with a U.S. agricultural engineer.) In the early sixties, Costa Rica had one agronomist for each 251 persons economically active in agriculture. Chile had one agronomist for each 355 such persons. Argentina came next with 603. In four other countries, there was an agronomist for each 1,000 to 5,000 active in agriculture. In five countries, there was one agronomist for each 5,000 to 10,000, and in five others, there was one for each 20,000 or more persons engaged in agriculture.

Improvement in Colleges of Agriculture

Governments and members of colleges of agriculture (facultades) are interested in improvement of these colleges. But this is not an easy task. Each facultad may be considered to have three essentials--buildings and other physical facilities; personnel, including professors and administrative staff; and students. Of the three, students are easily the most important, since it is through them that the work of the facultades reaches and benefits the nation as a whole. Thus far, however, the physical facilities seem to have fared better than either of the other two essentials.

Most of the governments have made provisions for new buildings or other physical improvements. Also, since 1961, loans or grants of over \$14 million have been made to schools in Argentina, Colombia, Mexico, Paraguay, Peru, and the Central American countries by the Social Progress Trust Fund from funds placed at the disposal of the IDB by the U.S. Government. The loans have financed buildings or other physical facilities of the agricultural colleges and are a part of nearly \$31 million in physical improvements which are to be financed by the Fund.

Various large foundations have also made substantial grants for improvements in facilities, especially for scientific equipment, books, and other equipment.

Some progress is being made in improving the agricultural teaching staff. The IICA gives graduate training in agronomic and animal husbandry subjects to a limited number of students or teachers from the various Latin American countries. The Agency for International Development (AID) and the foundations provide some fellowships in the United States and other countries to advanced students, and subsidize professors from the United States and elsewhere for limited periods of teaching and research in Latin American colleges of agriculture.

Many of the agricultural colleges are now receiving some increases in their budgets. Salary levels are still quite inadequate, however, and a high proportion of the professional staff teach only part time.

The most difficult and important problem facing the agricultural colleges is how to obtain students with a background of practical farm experience. From 80 to 90 percent of the students in the facultades in most countries come from nonfarm origins, largely because of the lack in farming communities of primary and secondary schools which could qualify farm boys and girls for admission to institutions of higher learning. This

is a situation that will take a long time to change. Even if all Latin American countries started to add schools in the open country immediately and to increase the number of years of schooling offered in their present schools, it would be about 10 years before any increase in the number of farm students would appear in the colleges of agriculture. In the meantime, shortrun remedies could be applied to assist outstanding pupils with farm background to attend more advanced primary and secondary schools. The vocational schools of agriculture with nonuniversity status could be strengthened to help bridge the gap. In addition, as already mentioned, something might be done to better acquaint students now in the facultades with practical farm conditions and farm problems.

The facultades of agriculture probably do about as well as could be expected under their present circumstances of limited budgets, low salaries for professors, high proportions of part-time teachers, scarcity of text material in some subjects, and low percentages of students coming from farms. To provide the future leaders who are needed for agriculture, however, many improvements are required.

The situation in the early 1960's was exemplified by the findings of the CIDA study of agricultural education in Ecuador (19). In that country there were four facultades of agronomy and veterinary medicine. In the 5-year period ending with 1964-65, these institutions averaged a total enrollment of 576 students but graduated average classes of only 67. Of 94 students at the University of Quito, 20 students reported that their fathers were farmers, but three of these said that their fathers had no land. Of the remaining 74, fathers of 26 owned land but were not farmers. The four colleges of agriculture in Ecuador had a total of 183 professors of whom only 19 were employed full time; 164 taught on a part-time basis. There was very little contact with farms or farmers. In the CIDA report, it was stated that "The Mission was not able to find in any of the institutions vital and well defined objectives to increase production, improve the situation of farm families, or help them to adopt new "methods." This seems to be a harsh judgment and yet similar opinions are expressed in other countries as well.

In Mexico, the general characteristics of the agricultural colleges resemble those of the other Latin American countries in most respects. In 1963, Mexico had seven facultades of agronomy and an eighth was established later as a branch of the University of Michoacan. The seven schools had total enrollment of about 2,000. In addition, the National Veterinary School of the National University of Mexico was reported to have 1,290 students in 1962. About half of the professors were employed full time (46). The Association of Directors of Superior Schools of Agriculture had the following opinion concerning the general situation of the schools:

The agricultural schools are generally isolated, causing loss of contact between professors and students following different fields of study, and are often without the humanistic and cultural studies needed to develop a well-rounded student.

The majority of the universities and institutions lack endowments of their own, and their investments and operation budgets are so inadequate that only a small minority of the population is favored with facilities provided for educational purposes.

Because of the social development and the evolutionary economic process of our country, superior agricultural education in some schools is still theoretical, encyclopedic and of versatile application.

Relatively little attention is given to humanistic studies or to agricultural economics in the Latin American agricultural facultades, although it is economic problems that cause most concern to farmers. Practically no attention is given in most countries to professional training in domestic science, but potential returns from improvement in diet, clothing, and shelter are very great.

Finally, it should be pointed out that in nearly every country, government officials and others complain of an insufficient number of trained persons in agriculture to staff government agencies and serve agriculture in other ways. This shortage becomes more serious as the size and number of agricultural projects increase, especially because of the deficiencies of training in the agricultural colleges. The most serious deficiency, however, is in the very limited number of students (and of professors) who can be said to have a practical farm background so that they can actually comprehend the farmer's problems and provide effective service.

Employment of Trained Personnel

Shortages of agronomists have been noted as well as of professionally trained persons in other fields. Agricultural economics is one of the fields most often neglected.

By no means are all the available agricultural professionals actively engaged in their specialties. For example, in Peru, in 1958, the Association de Ingenieros Agronomos estimated that there were about 1,500 ingenieros agronomos but that about 700 of them were no longer engaged in agricultural activities. Similar reports have been made for other countries concerning agronomists, veterinarians, economists, and professionals in other fields. The principal reason for abandonment of agricultural specialties is that most Latin American government agencies and educational institutions pay such low salaries that the employee is forced to take a second job to help support his family. This, of course, lowers the quality of the service. The employee frequently finds the second employment more profitable and interesting and it becomes his full-time work. This situation is especially bad in countries where there is rapid inflation, since adjustments in government salaries are likely to lag far behind the rise in cost of living.

A very high percentage of the trained personnel in agriculture in Latin America is employed in government agencies or in teaching positions. In Brazil, 15 percent of the agronomists and 18 percent of the veterinarians in 1959 were teaching in the facultades of agronomy or veterinary science; 10 and 2 percent, respectively, were in international agencies or those cooperating with foreign governments or institutions; and 75 and 78 percent were employed in federal or state agricultural agencies. Only 3.4 and 3.7 percent, respectively, were directly engaged in agricultural, commercial, or other such activities.

In Mexico in 1961, 79 percent of the trained agricultural personnel were in government employment of one kind or another and 21 percent in private agencies or activities. Similar employment distributions occur in other Latin American countries for those agricultural graduates who are still following their specialties.

The practice of employing professionals in agriculture for only part time, however, has become widely generalized. In Mexico, where there had been no great recent inflation, seven agricultural colleges employed 249 professors in 1963. Of these, 121 were employed only part time.

Four studies mentioned by Alvaro Chaparo bear on this situation (13). In these studies, students or graduate ingenieros agronomos were asked whether they came from large cities, small cities, or rural districts. Out of 164 agronomy students in 5 countries, 35 percent said they were from rural areas. Of three groups comprising 1,702 persons who had previously received the degree of ingeniero agronomo in various countries, 21 to 25 percent said they were from rural areas.

In Central America, the Consejo Superior Universitario Centro-Americano (CSUCA) made a study of students in the universities of that region (49, 50). Thirty-one percent of the 148 students enrolled in agronomy reported that their fathers were farmers, livestock men, lumber men, fishermen, or hunters. Considering the lack of educational facilities in the open country, it is highly probable that a majority of these fathers were

either unusually prosperous farmers or else they lived in towns. Fathers of another 37 percent of the agronomy students were businessmen, storekeepers, salesmen, or office employees. The remaining fathers of students were employed in a wide range of non-agricultural activities.

The profession of *ingeneiro agronomo* evidently does not appeal strongly to many young men in the region. Out of 926 university students whose fathers were farmers, or livestock men or were occupied in similar pursuits, only 31, or 3 percent, had enrolled in agronomy courses; 12 percent in veterinary medicine; 17 percent in law; 16 percent in science and letters; and about 12 percent each in economic science and engineering. The remaining 29 percent were enrolled in a wide variety of subjects ranging from dentistry to fine arts. The principal thing discouraging enrollment in agronomy was probably the realization that, after graduation, most employment opportunities would be in government agencies with the prospect of relatively low income and little challenge.

With the limited number of farm children who are able to enter institutions of higher learning, the percentage of agronomy students who actually come from farms must be very low and is probably well below the proportion who report that they came from rural areas. Probably, for Latin America as a whole, the proportion of *ingenheiros agronomos*, professors in facultades of agronomy, and students in agronomy and veterinary science who have actually lived and worked on farms is below 15 percent and perhaps not much above 10 percent of the total. In Argentina and Uruguay, it seems likely that a somewhat higher percentage comes from and returns to farms than in the rest of Latin America. This is because the large farms in these two countries offer more opportunities for the educated young man than do the typical small farms in the other countries.

It is not known just how much influence this lack of farm background has on the quality of agricultural programs and on the rate of agricultural progress, but it must be considerable. For some types of work, especially in research and administration, lack of farm experience probably makes less difference. For the planning of programs, however, this factor is quite important. Without farm experience, the agricultural official is in a poor position to judge how well the farmers will accept any given program; and, indeed, his proposals are less likely to conform to the requirements of the practical situations that they are supposed to help. In extension work, it is even more important that the professional have a farm background. Farmers are likely to look askance at an obviously urbanized agricultural official who probably does not speak in their idiom and displays ignorance of their interests.

For contacts with farmers, well-trained and carefully selected practical agriculturalists who have been reared on farms may be more effective than many of the non-farm *ingenheiros agronomos*. A corps of the latter, preferably selected from the limited number of farm-born professionals is, however, essential to plan the programs and direct the nonprofessionals.

As higher education is extended to greater numbers of farm youth, it is, of course, to be hoped that eventually the entire staff of extension workers and planners can be made up of those with farm experience. In the long run, this will no doubt occur as educational opportunities are increased for the farm youth.

In the short run, considerable improvement might be achieved by adopting a practice that has been used in some of the agricultural schools of the United States. Here, it is often required that before an agricultural student receives his degree he must show that he has lived and worked for at least a year on a farm. Such experience might be obtained in a single year or as a combination of three or four shorter periods.

Setting a higher salary scale in the Government service for graduates with the needed experience might be a way of encouraging students to obtain such experience. For further encouragement, the experienced graduates might be awarded a distinctive degree rather than the ordinary degree of *ingeneiro agronomo*.

AGRICULTURAL RESEARCH AND EXTENSION

The principles of research and extension have been universally recognized as necessary ingredients for agricultural progress. But the lack of their effective employment is a central problem of Latin American agricultural development.

Research

Experiment stations occupy the center of the Latin American systems of agricultural agencies. These vary widely in quality of work, ability of research workers employed, and in the degree to which the researchers have been able to grasp the problems of farmers. For the region as a whole, the number of research projects runs into the thousands. In general, they have two deficiencies—a lack of adequate planning and a narrowness of programs which neglects some important fields.

Research Problems

Breeding and testing potentially improved crop varieties are heavily emphasized in virtually all countries. This has been highly successful with coffee in Brazil and some other countries. It has led to improved hybrids or varieties of maize, especially in Mexico and Brazil; of wheat in Mexico and Argentina; of cotton in Peru; and improved varieties of grain sorghums, pasture plants, and a few fruits and vegetables in several countries.

With livestock, emphasis has been on the breeding and dissemination of improved strains of farm animals, especially of beef cattle; on artificial insemination; and on control of animal diseases.

Most of the research reflects monocultural habits of mind characteristic of many government officials and of commercial agencies. Nearly all the research programs are organized around individual crops or limited livestock problems; virtually none are organized with combinations of crop and livestock enterprises designed to maximize the farmer's income. Thus, many projects deal with coffee, cotton, bananas, sugarcane, corn, or wheat; but very few are concerned with entire cropping systems or with rotations aimed at maximum overall productivity and balanced soil management.

Many experiments have been made of the effects of fertilizer applications on crop yields. To maximize his income, the farmer must know not merely that some fertilizer will give some increase in yield but at what point an additional application ceases to yield an income greater than the added expense.

Very few fertilizer experiments have been so planned as to trace the curves of increasing and diminishing marginal yields. An exception however, is the research of the Sao Paulo system of experiment stations centered at Campinas. Research workers in this system have studied the successive yield of maize in response to fertilizer applications on certain types of soils. Indications of variation in yields on some crops can also be found in results of experiments in Argentina and in Colombia, but information has not yet been sufficient to give farmers practical guidance in fertilizer application (23, 24, 26-32, 100).

Dates of planting and harvesting crops, spaces between plants, and methods of planting, cultivation, and harvesting have received very little attention (11, 30, 33, 34).

In livestock production, little effort has been spent in studies of management practices or of rations, including mineral or protein supplements. In large tropical regions, there are serious declines in rates of gains on cattle during the dry seasons. Considering the great economic importance of such losses to livestock producers, it is surprising that means of avoiding them have not been made a major subject of investigation.

Little research has been done on farm management problems, or on the effects on earnings of variations in size and combination of farm enterprises. In most countries, the governments have not spent much effort in determining optimum utilization of credit, economy in use of farm labor, power and equipment, marketing problems, or price relationships. Increasing attention is now beginning to be devoted to these economic problems, however, in Argentina, Chile, and Brazil, especially in the states of Sao Paulo and Minas Gerais.

To a large degree, the lack of balance in the research programs may be attributed to the lack of communication between research workers and practical farmers. This is partly due to a lack of trained research workers in fields touching economic problems. Much of the difficulty, however, might be avoided by better planning and coordination of agricultural budgets.

Adequately trained technical personnel are very scarce throughout the region. This is aggravated by the very low salary scales for scientific personnel and the resulting rapid turnover. In those countries where there is inflation the difficulty is increased by the lag in adjusting salaries to increases in cost of living. Consequently, many potentially valuable programs are interrupted by loss of scientific workers who are forced to accept industrial or commercial employment to make a living.

In justice to the agricultural ministries, it must be pointed out that the responsibility for low salaries and lagging pay increases does not rest with them but is characteristic of the entire government structure which has not been able to keep revenues up to requirements.

In addition to government research, considerable research in agriculture in Latin America is done, or at least assisted, by various foundations, by international agencies, and by commercial organizations. Also, government research is not limited to the experiment stations. Many of the facultades of agronomy and veterinary medicine have experimental farms and conduct limited amounts of research, usually in conjunction with the ministries of agriculture.

In Mexico, outstanding work has been done by the Rockefeller Foundation in collaboration with the Secretaria de Agricultura y Ganaderia. In 1943, the two organizations formed the joint Oficina de Estudios Especiales or (Office of Special Studies) which has performed a valuable service in developing disease-resistant and high-yielding wheat as well as improved varieties and hybrids of maize, grain sorghums, beans, potatoes, and forage crops.

More recently, the Rockefeller Foundation entered similar cooperative arrangements with Colombia and Chile where the results of the Mexican experience have been put to further use.

In Venezuela, some research, especially on vegetable crops and plant disease control, is done by Servicio Shell para el agricultor under the Shell Oil Company. In Central America, various research activities related to banana production are conducted by the United Fruit Company. In Brazil, Anderson-Clayton Company conducts a small experiment station to study means of improving and increasing yields, especially of cotton.

The FAO provides considerable advisory personnel and other support for agricultural studies throughout Latin America.

Greatest outside support to agricultural research in terms of personnel and finance, however, is furnished by AID. AID has offices in nearly all the countries of the region and places the agricultural research facilities of the U.S. Government at the disposal of Latin American governments that wish to take advantage of them.

Selected Research Programs

Generalizations about research may be made more realistic by a brief review of the programs in some specific countries.

In Argentina, research as well as extension work is conducted by the Instituto Nacional de Tecnologia Agropecuaria (INTA), established to provide dynamic leadership for such work and to assume responsibility separately from the Ministry of Agriculture. Its 1961-62 budget was equivalent to about US\$14 million. It is governed by a board which represents the Ministry and also farmers and other private persons. Its support comes chiefly from a tax of 1.5 percent on agricultural exports.

INTA had an organization of 42 experiment stations in 1966, and employed a total staff of nearly a thousand in research and extension combined. Numerous staff members are sent abroad to take advanced studies in the United States and Europe. Most of the research, however, continues to be in agronomy, especially in varietal improvement, and in livestock production and disease control. This is shown by the following percentage distribution of the 1961-62 research budget:

Crops, including weed control-----	36.6
Livestock, including disease control ----	16.7
Natural resources -----	16.0
Agricultural biology and zoology-----	15.0
Agricultural engineering -----	6.9
Economics, rural life -----	2.5
Forestry-----	0.8
Domestic science, human nutrition ----	0.3
Unclassified -----	5.2
Total-----	100.0

Since 1962, INTA has expanded its program considerably and added some new fields of investigation, including studies of marketing of agricultural products and sociological studies of some rural communities.

Each experiment station and extension agency has an advisory board, consisting of farmers, bankers, business men, and representatives of agricultural cooperatives. These advise on local problems and participate in financing cooperative extension agencies, where the community contributes to the financial support. These help greatly in maintaining contact with and support of the practical farmers (1, 3).

There is also some research work in agronomy at the universities of Buenos Aires, La Plata, and Cuyo. Not many studies are made of animal production problems. There is a general scarcity of information on methods of production as related to returns and also on size of farm and combinations of crop and livestock enterprises. A number of farm management studies, however, have been underway in the INTA in recent years.

In Brazil, most of the research under the Ministry of Agriculture has been devoted to agronomic problems. Relatively little has been published about results. There are around 40 experiment stations, organized in five regional institutes with another institute at the Rural University of Brazil in Rio de Janeiro. In 1962, the research budget was equivalent to about US \$4.5 million but has since been increased.

In 1961, a list of 1,205 projects under the national agricultural research system was published by the Associacao Brasileiro de Credito e Assistencia Rural (ABCAR) (4). Of the total, 534 projects were concerned with development or testing of crop varieties and 423 with fertilizer experiments, making 80 percent of the total number. These were followed by 74 experiments in the spacing of plants in the field, 63 on dates of planting, and 20 to 30 each on use of herbicides or fungicides, selection and treatment of seeds, and various cultural practices.

When classified by crops, it was found that 289 experiments were concerned with sugarcane, 158 with corn, 103 with wheat, and 59 with coffee. Only one was reported for bananas and one for cacao, although these are both important crops. Some additional work has been done on cacao at the Urucuca experiment station in Bahia.

There are, in addition, agricultural experiment stations under direction of some of the states. Of these, the Sao Paulo system of experiment stations has been especially important for its work on coffee as well as on corn and some other subjects.

Other state research of note is carried on in Rio Grande do Sul, Minas Gerais, and Pernambuco (11, 5, 8).

Little attention has been given to problems concerning livestock, agricultural economics, and some other subjects. Deficiencies may be traced chiefly to poor orientation of programs related to the needs of farmers, to lack of research training of experiment station personnel, and to low salaries which result in loss of many of the more promising research workers (62-70, 74-76).

In Chile, a large part of the work of the Ministry of Agriculture is concerned with problems affecting field crops, especially varietal improvement. A number of studies of farm management and prices have been made in the past few years. But little attention has been given to fruits and vegetables or to livestock problems.

Collaboration between the Ministry and the Rockefeller Foundation has already been mentioned. This is carried out through a Joint Office of Special Studies and deals with improvement of cereal crops, pastures, forages, and some problems in agricultural engineering.

In Peru, the Servicio de Investigacion y Promocion Agraria (SIPA) of the Ministry of Agriculture has four experiment stations and nine substations. Despite considerable support from AID and IICA, the research budget for SIPA has not been adequate for the problems with which it must work. One complication, perhaps the principal one, comes from the physiography of the country. Agricultural problems in the dry, coastal region differ greatly from those in the upland or sierra regions and from the tropical forest or eastern lowlands. To deal with these divergent needs, there is an experiment station and national research center at La Molina near Lima and a second station at Lambeque which works chiefly on cotton and rice. A third, at Mantaro, serves the sierra region and works chiefly with potatoes, barley, corn, and wheat. A fourth, at Tingo Maria, studies cacao, coffee, yuca (manioc), corn, and tropical forage and pasture crops.

In Peru, there is also agricultural research work under the support of private associations. These associations include the Sociedad Nacional Agraria (for cotton), the Sugar Producers Association (for sugarcane); Malteria Lima on barley; and two associations with more generalized interests, the Liga Agricola y Ganadera del Valle del Chira, and the corresponding associations of the Canete and Ica valleys.

Although the specialized interests of some of these private organizations lead to a monocultural approach, their overall effect is undoubtedly beneficial since they perform services which the national system may overlook or be unable to accomplish with its limited resources.

In Colombia, the Ministry of Agriculture operates several experiment stations. Most prominent are at Tibaitata near Bogota (elevation 8,500 feet), Medellin (4,000 feet), and Palmira in the Cauca Valley (3,000 feet). These stations study problems of the locally important crops. There is also an Institute of Animal Disease Control. Little attention has been given to problems in agricultural economics.

As in Mexico and Chile, there is a beneficial collaboration with the Rockefeller Foundation. Also, several official or semiofficial agencies in Colombia work with individual crops, thereby contributing to a monocultural outlook. Among these, the strongest is the Coffee Federation which carries on research as well as extension work. Some of the other agencies are a tobacco institute, a rice institute, and a cotton institute.

In Mexico, the Secretaria de Agricultura y Ganaderia (SAG) conducts research through the Instituto Nacional de Investigaciones Agricolas (INIA). This agency was established in 1960 to take over the work of the Oficina de Estudios Especiales and of the old Instituto de Investigaciones Agricolas. In 1962, INIA employed 231 technically trained persons. Of these, 131 were concerned with plant production problems, 20 with soils, and 28 with plant pathology and weed control. Thus, 179, or 77 percent, of the employees were involved with crop production, either directly or indirectly.

Relative emphasis is further indicated by the distribution of the remaining 52 professionals--biometry, 3; agricultural economics, 7; publicity, 10; and administration, 32.

Other agencies which perform some research or work of a developmental nature include a national institute for the production of seed, an institute for improvement of sugarcane, and a forest research agency. In addition, the Secretaria de Recursos Hidraulicos does some research on the best methods of using irrigation water, correction of salinity, and related matters.

The Centro Nacional de Investigaciones Pecuarias (livestock) was established in 1962. It works chiefly in the semiarid northern region with pasture management, animal nutrition, physiology of reproduction, feed analysis, and artificial insemination. Its budget for 1963-64 was three million pesos (\$240,000) plus some support from the Rockefeller Foundation.

The principal agency for research in Central America is IICA, located at Turrialba, Costa Rica. It studies crop production problems of importance in tropical America, especially those concerning coffee, cacao, forage, and vegetable crops. There is a more limited program on livestock production and disease control. Studies of economic problems have been limited during the past several years, but renewed activity has been shown lately.

There has been some activity in economic research in the University of Costa Rica.

In addition to IICA, research stations are conducted by the Ministries of Agriculture of the five Central American countries, agricultural schools or universities in four countries, four cooperative organizations (three of coffee and one of cotton production), a development bank, and the United Fruit Company. In all, there are about 25 experiment stations in the region, most of them small. In 1964, these stations employed about 275 professional personnel. Information on the training of 200 of these persons showed that 51 had doctor's degrees, 6 had master's degrees, and 36 were veterinarians. The rest were ingenieros agronomos or were without university training.

With the small size of the Central American countries and with their limited budgets, research work in the region can be greatly promoted by coordination and exchange of information. Fortunately, this has been realized and considerable progress has been made, with the assistance of such organizations as AID's Regional Organization for Central America and Panama (ROCAP), IICA, and the Rockefeller Foundation. In 1964, the Subcommittee on Agricultural Development of the Central American Committee on Economic Cooperation recommended that IICA undertake coordination of agricultural research in Central America. The group believed that more attention should be given to the production of basic foodstuffs.

Research Patterns

Similar patterns of research emerge for virtually all the countries of Latin America. These conform in a general way to the curriculum of the facultades of agriculture. Awareness is shown, first, of the scientific aspects of crop production where major emphasis is placed on breeding, selection, and testing improved varieties of field crops. Related also to crop improvement are such subjects as fertilizer tests (commonly carried out in a rather haphazard manner) and the control of weeds, plant diseases, and pests.

Secondary emphasis is given to animal production, chiefly to disease control. Few agricultural colleges give more than passing attention to other animal problems such as methods of management, rations, or costs.

Most of the economic aspects of crop and livestock production have not been studied by Latin American governments. Only scattered research agencies have studied marginal yields from successive applications of fertilizer or economic aspects of the use of

herbicides or of insecticides, and little has been done to determine the physical or economic effects of variations in intensity of use of labor or of animal or mechanical power. Studies of marketing are very largely descriptive and apply to limited stages of marketing of individual products, rather than to overall processes.

It was pointed out that, in a recent Argentine research budget of the Ministry of Agriculture, studies of agricultural economics were granted only 2.5 percent; crops about 37 percent, and livestock 17 percent of funds available. And yet since the farmers' primary objective is to maximize income it is the economic problems that interest farmers most. It was only recently that attention began to be given, either in educational institutions or in research programs, to diet, clothing, and housing of the rural population.

The interests of farm women are largely neglected except in Brazilian states of Minas Gerais and Rio Grande do Sul. Such problems are, however, given some attention in the extension programs of Colombia, Venezuela, and to a minor extent, in a few other countries.

The most plausible explanation of the gaps in the research programs is that the administrators as well as the rank and file of agricultural educators and research workers are out of touch with practical farmers. This situation is partly explained by the predominantly urban origin of students and professors in agricultural colleges. Bringing the facultades and the research agencies into a closer understanding with the farmers would constitute a long step forward.

Extension

It is the purpose of the extension service to take to the farmer whatever information he may need concerning agricultural methods, crop varieties, equipment, disease and pest control, marketing situations, price prospects, and utilization of resources for maximum returns. Such data must be simplified and interpreted in a manner suitable to the farmer's background and to his local conditions and problems.

The official extension service is by no means the only source of such information. There are also agricultural journals for the farmers who can read. Unfortunately, in Latin America the group utilizing such publications is usually limited to the larger and more prosperous farmers.

Much work is done by agencies other than the regular extension services, including agricultural development agencies, land settlement agencies, and others. In addition, many commercial and industrial organizations conduct educational programs concerning their own products or services. These include manufacturers and dealers in farm equipment, seeds, fertilizers, herbicides, pesticides, and so on, as well as many companies that purchase farm products for processing, exportation, or domestic resale (tobacco processing companies, breweries that purchase barley for malting, companies which process or distribute milk, and purchasers of coffee, cotton, and other crops). Commercial organizations tend to establish contact with large-scale farmers rather than small-scale farmers. However, they reach some strata not greatly affected by printed material or by the regular extension services.

Some farmers' cooperatives provide members with guidance and information. In Argentina, the Consorcio Rural de Experimentacion Agricola (CREA) organizations consist of 12 to 16 large ranchers each. Each group employs an agronomist or other technically trained person to assist its members in working out problems of farm organization and operation. In 1966, there were 73 of these cooperative farm study organizations providing a potent influence for improvement on the larger farms.

Technical assistance is provided in Brazil by the Cooperativa de Cotia and by the Mogiana Central Coffee Growers Cooperative.

In Colombia, the Federation of Coffee Growers provides extension assistance to its members in addition to conducting an experiment station and playing an important role in determining coffee policy. Other similar groups are the Cotton Growers Cooperative of the Canete Valley in Peru and various cooperatives of coffee and cotton growers in Central America.

For the ordinary farmer, however, the most important source of information is his neighbors. In addition, he has whatever knowledge his father has handed down to him of the many traditional practices that have been used in the immediate neighborhood for decades and sometimes for centuries past. This provides guidance on such questions as when to plant and harvest, how much seed to use per hectare, depth of planting, how to use farm tools and implements, care and feeding of farm animals at the various stages of their development, and many minor procedures. Taken together, these traditional operations comprise by far the greater part of farm technology in any given neighborhood. Since they are so broad in total coverage and have been a large part of the farmer's store of knowledge since boyhood, it is small wonder that the demonstrable effects of official extension work often look so small.

Extension Problems

Extension work in Latin America is held back by the same general impediments that hinder research and higher education. First, inadequate budgets are a serious limitation. These may result either from limited resources or from fiscal policy. Their undesirable effects have already been pointed out in connection with research work. Results are seen in poor work, a high percentage of vacant positions, a rapid turnover of professional workers and a heavy loss of such workers to commerce and industry.

In many cases, however, closer coordination among different branches of the agricultural service might well obtain better results from the same appropriations than are being obtained at present.

There are exceptional cases where budgets are relatively adequate. An example is found in the state of Sao Paulo in Brazil. There, a more generous and effective policy is followed and higher salaries are paid than in the Brazilian federal service or in other states. This gives Sao Paulo the pick of available personnel and is an important factor in explaining its rapid progress.

In several countries, a commercial and monocultural attitude toward agriculture has led to fragmentation of the extension service. Colombia provides an example. In addition to the general or national extension service, Colombia has also services for coffee, cotton, tobacco, and rice, at least two regional agencies under development corporations, plus extension agencies operated by some of the states. It is rather common to find separate extension agencies for crops and for livestock.

Not only do the multiple services increase expense, they also perpetuate monoculture. Their teachings and their promotion of individual enterprises often run counter to the objective of the farmer whose interest is to develop a combination of crop and livestock enterprises that will yield him maximum net returns rather than to confine his farm to any one crop to the exclusion of others.

A further impediment to extension work, which also results from inadequate budgets, consists of insufficient provision for travel by extension workers. There are seldom enough vehicles for all the agents, and many of the jeeps or autos are often out of service and awaiting repairs. This condition, plus limited travel funds, prevents agents from holding meetings and visiting farmers as often as they should for best results.

In several countries, persons without professional training, such as nonacademic-agriculturists, are employed as extension agents or assistant agents. In fact the non-professional extension assistant who was reared on a farm may be more effective in a simple type of extension program than an *ingeneiro agronomo* who has had no practical

farm experience. Material improvement is needed, however, in the training offered nonprofessional agriculturalists.

In recent years, most of the larger countries have been making some provision for training extension agents either before they are appointed or while they are on the job. In Argentina, INTA has an inpractice course lasting 6 to 8 months. Several countries make an effort to send key officials in the extension service to the United States or Europe for training and observation of methods.

Extension in home economics has suffered especially from lack of adequate training. It was only around 1950 that home economics courses of a professional caliber were started in Brazil at the Rural University of Minas Gerais. This work has been a notable success, and a similar university-level course was later instituted in Rio Grande do Sul.

In most of the other countries, home demonstration agents usually have no really professional training. Usually they are graduates of normal schools or are ordinary school teachers who have been given a short course in the specific material they use in meetings with farm women. This essential branch of activity will undoubtedly grow. But professional schools must be established and objectives be clearly defined before home economics approaches its potential importance for the farm population.

Selected Extension Programs

There are several differences among Latin American extension systems. These depend on the size of country, the important farm products, the organizations of farmers and the subjects in which they are interested, the structure of the agricultural branches of the governments, size of their budgets, and the types of training in the agricultural schools from which extension workers are recruited.

In Argentina, the extension service forms part of INTA which also directs the experiment stations. In 1966, there were 155 extension offices, and these were organized under seven regional centers. INTA's inservice training course has already been mentioned. The effectiveness of the service has improved materially since INTA was organized in the mid-1950's.

The extension service of Brazil has had a rather varied history. The Associacao Brasileira de Credito e Assistencia Rural (ABCAR) was founded in Minas Gerais in 1948 with the support of American International Association. After 1948, corresponding organizations were established in other states until they were in operation in 16 of Brazil's 21 states in 1965. In that year, ABCAR reported that it had 67 regional and 514 local offices and that in the preceding year it had done some work in 767 municipios (out of a total of nearly 3,000). It was reported that ABCAR's 1,155 technically trained employees had made 165,000 visits to farms during the preceding year and that farmers and farm wives had made 187,000 visits to ABCAR offices (4). (The 1960 census had enumerated approximately 3.3 million farm properties.)

ABCAR began its activities by offering loans to farmers at favorable interest rates. Its 1965 report showed a total of approximately 11,700 such loans which averaged the equivalent of slightly over \$300 each.

ABCAR provides an intensive service to a relatively limited number of farmers. Most of the service is to small farmers and includes information and guidance of the normal extension type, some health service, and the provision of limited amounts of credit obtained from the National Carteira de Credito Agricola e Industrial of the Banco do Brasil and from state banks.

The supervised credit is granted, preferably to younger farmers who appear to be especially capable but are restricted in their operations by the lack of capital. Interest rates charged by ABCAR have been several percentage points below those available to farmers in general and to merchants, manufacturers, and others.

Although ABCAR is now recognized as the official extension service of Brazil, it is noteworthy that it operates in only a small proportion of the Brazilian counties.

In addition to the Federal services, some of the states have their own extension services. Of these, the outstanding ones are in Sao Paulo and Rio Grande do Sul. An effort is made to avoid duplication by means of conferences and coordinating committees.

The method of supervised credit has spread to several other countries and has been highly popular with extension workers. An offer of a subsidized interest rate, even on small loans, makes it much easier for extension agents to get the attention and participation of farmers who might otherwise be uninterested in methods or projects proposed by the agricultural ministries.

Several other agencies have done some work of an extension nature in Brazil. Up to 1962, there were two parallel services: The Fomento da Producao Vegetal, which gave information and assistance on problems concerning crops, and the Fomento de Producao Animal, which worked with livestock problems. A farmer with diversified enterprises, therefore, had to consult two separate agencies if he wanted information on more than one type of enterprise. Furthermore, there was no corresponding agency to deal with farm management or marketing problems that affected the farm as a whole, although there was in the Ministry of Agriculture a small division of agricultural economics. There was also an agricultural information service which issued a few pamphlets and bulletins.

In 1962, the two parallel services were combined into the Fomento da Producao Agrepecuaria. This new agency, instead of providing all-around extension service, was soon diverted into various activities hardly of an extension type, including various types of inspection and control and selling of tractors, farm implements, fertilizers, insecticides, and other supplies, in an effort to lower their prices to farmers.

In Chile, the Departamento de Conservacion y Asistencia Tecnica (DECAT) is the national extension service. In 1963, it had 53 agencies with 70 agronomists and 31 home economics demonstrators plus 21 subprofessionals. In Chile, there is also a supervised credit agency which, like DECAT, is in the Ministry of Agriculture. It carries on additional extension activities, apparently with little coordination with DECAT.

Relatively few Chilean farmers consult the technical agencies or receive bulletins or other publications from them. Principal extension activities are with small farmers.

This raises the interesting question of whether the Government's objective is to relieve the poverty of low-income farmers or to increase production. The question becomes even more important when it is realized that the extension service does not reach more than 10 percent of the farmers. Thus, it cannot be said to have very much effect on either the volume of production or relieving poverty.

In Peru, the principal extension agency is the Servicio de Investigacion y Promocion Agraria (SIPA). In 1962, it had 50 agencies, employing 129 ingenieros agronomos, 28 veterinarians, 26 home demonstration agents, and 123 field assistants. Members of SIPA have estimated that to reach 50 percent of Peru's farmers, it would be necessary to treble the number of agencies, create 300 subagencies, and employ 900 technically trained persons. Such a number greatly exceeds the existing number of technically trained persons in Peru.

In addition to SIPA, extension work is performed also by the Banco de Fomento Agropecuario, the Sociedad Nacional Agraria, and the Programa Andino of the International Labor Organization. This leads to much the same type of fragmentation, if not duplication, of service found in other countries.

Colombia represents an extreme case of duplication of services. In 1962, the six major agencies doing extension work with their number of trained personnel were the Ministerio de Agricultura, 124; Federacion de Cafeteros, 483; Instituto de Fomento Algodonero (cotton), 31; Instituto de Fomento Tabacalero, 24; Secretaria de Agricultura de Antioquia, 30; and the Corporacion Autonoma Regional del Cauca, 48.

These six agencies include 142 extension agents, 159 home demonstration agents, 361 juvenile club assistants, and 78 specialists and administrators. Of the total of 740 technical personnel, only one-sixth were employed by the Ministry of Agriculture.

There were also other extension services in Colombia in addition to the six, including some minor commodity institutes, various services under individual states, and some representing firms engaged in selling herbicides, insecticides, and other farm supplies. In fact, a well-informed agricultural authority in Colombia stated that he had counted 25 extension services of one kind or another.

Some of the autonomous agencies in Colombia do good extension work. There is obviously a lot of administrative duplication. But the number of farmers who consult or are consulted by more than one agent is undoubtedly very small. Low salaries, lack of technical training (especially of the home demonstration agents), an insufficient number of vehicles, and bad roads all reduce the overall effectiveness of the work. In addition, the emphasis on individual crops tends to perpetuate monoculture and, to some extent, delays diversification of farms.

In Venezuela, the Servicio de Extension of the Ministerio de Agricultura y Cria easily overshadows two small and rather specialized services. One of these is the Consejo de Bienestar Rural (Council of Rural Welfare) which works with economic and social problems and is supported by the government and the American International Association. In 1962, it had a technical staff of 11. The other is Servicio Shell para el Agricultor which is supported by the Shell Petroleum Company. In 1962, it employed 14 ingenieros agronomos, and 11 other technically trained persons. Its activity is in the introduction of new varieties of vegetables and in encouraging the use of herbicides, pesticides, mechanization, irrigation, and crop rotation.

The extension service of the Ministry of Agriculture in 1962 employed 98 ingenieros agronomos, 182 home economics demonstrators, 222 nonacademic agriculturists, and 6 others, or a total of 508 persons with technical training. There are various estimates of the number of farmers that can be reached by this staff; the largest estimate is 17 percent.

In Mexico, there are several extension-type organizations. The largest is the National Extension Service under the Secretaria de Agricultura y Ganderia. Funds and personnel, however, are limited. There are also agencies specializing in coffee, corn, milk, sheep, seed improvement, and so forth. Furthermore, short courses for farmers are given by brigades (groups of specialists) sent out by the Secretariat of Agriculture, and are attended by large numbers of farmers.

The extension services of Central America encounter much the same problems as those already reviewed, plus additional ones that result from the small size and limited resources of the individual countries. There is also the usual scarcity of trained personnel.

Numbers of extension agents and assistant agents employed in 1965 were as follows: Guatemala, 94; El Salvador, 70; Honduras, 31; Nicaragua, 32; and Costa Rica, 41. For the five countries combined, there were 84 juvenile club agents, 58 home demonstration agents, and 47 supervisors and specialists.

The total of 174 agents and assistant agents plus 283 other employees in 1965 served a total of about 900,000 farmers. The intensity of service differed widely from country to country. Costa Rica had one agent or assistant for each 1,600 farmers; Nicaragua, one for 1,900; El Salvador, one for 3,200; Honduras, one for 5,000; and Guatemala, one for 11,000.

Guatemala has the problem of a large indigenous population, many of whom speak no Spanish but one of some 20 native languages or dialects. Similar problems exist in Mexico and Peru. Guatemala meets the difficulty by conducting a separate extension service for the indigenous population, the Servicio de Fomento de la Economia Indigena (SFEI). In this, 15 expert agriculturists were employed as agents and 48 as assistants.

In Honduras, extension work is done by the Organization for Rural Development (DESARRURAL), which is supported by the Government and AID. Because of limited funds, this agency was reorganized in 1962, the work was restricted to a limited number of projects, and home demonstration was dropped.

The extension service in Costa Rica is one of the oldest in Latin America, and it is one of the most effective. It carries on a wide range of activities, from soil conservation to community development. Emphasis is placed on improvement in production methods, especially for crops on which the government places a high priority. Considerable emphasis is also placed on household improvement, including diet, and on the 4-S young peoples' clubs which correspond to the 4-H clubs in the United States (4, 11, 14, 35, 71, 73, 76-79, 82).

A study by the U.N. Economic and Social Council in 1964 throws an interesting light on accomplishments of Central American extension services (55). Information on numbers of farms served showed that the Costa Rica extension service had contacts during the year equal to 15 percent of the number of farmers in that country. In El Salvador, such contacts were 4 percent, and in Guatemala, 5 percent. The figure for Guatemala, however, refers to the regular extension service only and does not include SFEI. An estimate for Honduras indicates that the extension workers of that country reached about 4 percent of the farmers. These studies probably come closer to the facts than some of the more optimistic estimates often quoted for other countries.

LAND RESOURCES AND USE

Is the supply of land in Latin America sufficient for the needs of its growing population? Is it fertile or poor? How accurate and complete is information about the region's natural resources?

Land Characteristics

The region is one of great diversity. Many generalizations and reform proposals for Latin American agriculture have gone astray because inadequate attention has been given to this fact. Brazil, Bolivia, Peru, and Colombia all contain large areas of the great Amazon rain forest. But there are also areas that are arid or semiarid. Some sections are level or gently rolling, and others are too mountainous for ordinary crop production. The three southernmost countries as well as Mexico and parts of Central America are temperate in climate. The others are chiefly tropical or subtropical.

The 19 republics (listed in appendix table 1) have a total area of about 20 million square kilometers (7.8 million square miles). In 1960, approximately 8.3 million square kilometers (2,060 million acres), or slightly over 40 percent of the entire area of these republics was in farms.

The number of farm operators in 1960 is estimated, roughly, at 11.6 million, including 1.4 million Mexican ejidatarios (communal farmers) (58, 59, 62).⁵ These figures, however, must be taken with care. Definitions of farms and of farmland differ from country to country. In most countries, the census enumeration refers to the operating unit. Thus, two parcels of land operated by the same man are counted as a single farm. But in Brazil, if the two parcels are not contiguous, they are counted as two farms. Usually operators of forestry projects, hunters, and fishermen are all added in with the farmers.

⁵ Five of the national censuses on which this estimate is based were taken in 1960, five in 1961, one in 1963, and six at various dates from 1950 to 1956. Estimates of the increase in number of farms were added or subtracted to obtain an approximate figure for 1960.

Fortunately, nonagricultural projects are not very numerous and usually do not cause much error in the reported number of farmers.

Data from recent censuses show land utilization by broad categories for 16 countries. When arranged in order of percentage of land in crops, these countries fall into two well-defined groups. One group consists of the five Central American countries (plus Panama and the Dominican Republic) that reported having over 20 percent of their land in crops, including tree crops. On an average, just about one-third of this land was in crops, and equal amounts were in pasture or devoted to such nonagricultural uses as woodland, roads, buildings, or waste.

The remaining nine countries had less than 20 percent in crops and over 50 percent in pasture. This group included the five southern countries of South America and Peru, Colombia, Venezuela, and Mexico.⁶ Although the value of crop production was usually greater than that of livestock, grazing of cattle was important in nearly all countries.

Eleven percent of the land in these nine countries was used for crops, 54 percent for pasture, and the rest for woodland or other nonagricultural purposes. The principal explanation for the extensive types of land utilization is found in the large areas of mountainous or semiarid land.

The specific use for a given piece of land is determined chiefly by its physical characteristics and the existing economic conditions. But social and political influences also play a role.

Argentina provides a good illustration of the variation in land productivity and use within a single country. The Pampas region comprises one of the largest and most uniform areas of good land in the world. But this region is only a small part of Argentina and lies within a semicircle around Buenos Aires with a radius of 400 to 600 kilometers (250 to 370 miles). Chief products are corn, wheat, beef, and dairy products plus minor crops.

South of the Pampas lies Patagonia, a semiarid, low plateau with gravelly soils and a sparse growth of vegetation best used for pasturing sheep or goats. To the west of the Pampas, in the rain shadow of the Andes, there is a rapid decline in rainfall. This means poorer pasture. But there are also scattered areas of irrigated land. With water, these oases are highly productive for fruits, vegetables, and vineyards.

To the north of the Pampas, the quality of the soil declines, and there are poorer pastures along with forested land and scattered swampy areas near the Argentine Chaco. In that section, the warmer climate affords greater advantage to cotton and rice than to crops of the temperate zone such as wheat and corn.

Northeast of the Pampas and east of the Parana River, the poorer soils and more sandy lands in Corrientes province are used for more extensive types of farming, including cattle, sheep, and some rice. Finally, in the northeastern corner of the country is the subtropical province of Misiones. Here, agriculture differs even more from that of the Pampas. Tree crops, especially yerba mate and tung, are widely produced, with smaller areas of corn and minor crops.

These paragraphs do not cover all the distinct agricultural regions of Argentina. There are striking variations in types of agriculture which are caused largely by differences in soil, topography, and climate. Argentine agriculture includes extensive sheep production, beef production on large and medium-sized farms, cotton production, fruit and wine, tung, and yerba mate.

To the west of Argentina, the agriculture of Chile is largely determined by physical conditions, including climate. Most of the agriculture is located in the central valley, extending from about latitude 30° to 42° south. Principal crops are wheat; potatoes; fruits (especially apples and grapes); beans, lentils, and other legumes; and cattle and dairy production. South of this area, cool climate, high rainfall, and rough land favor sheep production and forestry.

⁶ Although no data are available for Bolivia since its agrarian reform in 1953, Bolivia would undoubtedly fall into this group.

To the north, very low rainfall makes agricultural production impossible except in limited sections where there is irrigation. The arid coastal lands continue into Peru where agriculture can be carried on only with the aid of irrigation from the small streams that flow out of the mountains.

It will be noted that natural conditions, and especially climate, have the chief role in determining the location and type of agriculture in Argentina, Chile, and Peru.

Even here, however, an essential role is played by economic influences through the price structure and capital requirements for irrigation. Without heavy investment in irrigation works, there could be but little production in the foothills of western Argentina, in much of the central valley of Chile, and in the sugar and rice areas of Peru.

Coffee provides an interesting illustration of the wide variation in conditions under which a crop can be produced and also of the roles of technology and economic conditions in determining crop location. The shifts in location and in combinations of coffee with other crops illustrate, also, the great flexibility in land use.

In Brazil, coffee offers the highest returns and consequently has first choice of land wherever conditions are favorable to it. Thus, the bulk of the coffee crop has been produced recently on the highly fertile terra roxa lands of eastern Sao Paulo and on similar lands in Parana. Over several decades, coffee was the preferred cash crop in much of Minas Gerais, until soil exhaustion and aging of trees forced its displacement by corn or pasture.

In Sao Paulo and Parana, improved coffee varieties and technology, coupled with high prices after World War II, led to extension of coffee production into poorer land farther west in Sao Paulo and southward into areas more susceptible to frost. The result was a heavy kill of coffee trees in some new areas by drought and frost in 1963.

Meantime, low world coffee prices along with favorable Brazilian sugar prices have led to rapid extension of production of sugarcane in eastern Sao Paulo and of peanuts and other crops on the sandy lands in western parts of the state.

In Colombia and Guatemala, the position of coffee is somewhat different. This crop can be produced advantageously on the steep lands of these countries. In addition, the alternatives are not so promising in such areas as are the alternatives to coffee in Sao Paulo. Hence, coffee's dominance in Colombia and Central America was never threatened to the extent that it has been in Sao Paulo or Minas Gerais.

In Colombia and Guatemala, supplementary crops are of great importance both in utilizing part of the land and labor and in contributing to farm income. In Comision Economica para America Latina (CEPAL) studies a few years ago, it was found that only about 16 percent of the land on coffee farms in areas of Colombia and Sao Paulo was actually in coffee, although that crop produced over half the income. The rest was in other crops or in pasture. One reason for this was that not all the land on a farm (certainly not on a large one) is equally suited to coffee. Second, coffee requires great amounts of labor per hectare at certain times of the year but does not provide employment the year around--hence, the opportunity to combine raising of cattle and growing of such crops as corn, sugarcane, or cotton with production of coffee.

In Colombia, as well as in Sao Paulo, there are areas that are highly fertile and have favorable topography and climate, but are not suited to coffee production. Examples are found in the Cauca Valley, the Sinu Valley, parts of the Magdalena Valley, and in the higher mountain valleys (sabanas). In the Cauca Valley, there is a limited area with an elevation favoring production of coffee, although the quality of the coffee produced is not of the best. But the same area is more highly favorable to sugarcane, to pasture, and to vegetable and fruit crops which could be grown for the local city market in Cali. Hence, coffee tends to be grown in the higher elevations in this area and the available land in lower elevations is used for sugarcane, vegetables, and pastures.

Determinants of Enterprise Selection

For maximization of income, a multiple, and not a unitary, selection of enterprises is required. The general principle, which is familiar to students of farm management, may be summarized somewhat as follows: From each group of high-return enterprises that could be adopted under the farmer's environmental and economic conditions, the one that promises the highest longrun, net returns for the farm as a whole can be selected.

To this, it is advantageous to add complementary enterprises such as cattle or hogs to utilize feeds, pastures, and forage crops and legumes or green manure crops to maintain soil productivity. Finally, an effort should be made to increase income by means of supplementary enterprises to utilize land, labor, or other resources not used by the enterprises already selected.

From observation, it may be said that Latin American farmers probably conform to this principle better than is realized by the officials and planners. This is true particularly of those with medium-sized farms rather than very large or very small ones. A farmer is not likely to hesitate long in adopting a new enterprise or a new practice if it promises to increase his income, and if his resources permit. The official, farther removed from the practical problems of the farm, may not be aware of the precise incentives of the farmer, nor of the critical shortages and price relationships that limit his freedom of action.

Information Concerning Land Resources

The individual farmer is usually well acquainted with the characteristics and capability of his own land. In appraising future prospects and information on policy, however, government officials or planners need an accurate inventory both of settled and of potentially usable lands, types of soils and their location, topography, supplies of surface water, availability of subsurface water, climatic characteristics, and general capability of the agricultural land in each region.

Such information varies greatly in its coverage and accuracy from one country to another. There are great areas of potentially usable land that have not yet been settled. Furthermore, when needed, more intensive use could be made of much of the land now in farms. In most Latin American countries, information about unsettled land is fragmentary, and surveys of soils, water supplies, and so on, are scarcely begun.

Aerial Photography

Aerial photography is an almost indispensable tool in soils studies. Small-scale aerial photographs are useful as a preliminary step in soil mapping and for other purposes. Medium-scale photographs provide a basis for more detailed studies of soils and land use, and large-scale photographs provide a basis for cadastral studies, irrigation projects, and other engineering works.

There are large areas that have not been photographed even at a small scale. Most of the settled regions of Mexico, Central America, Colombia, Venezuela, Chile, Peru, Argentina, and southern and eastern sections of Brazil have been photographed at small scale. The countries with most coverage at medium scales of 1:10,000 to 1:30,000 include Central America, Mexico, Argentina, Chile, and parts of Brazil. Medium-scale photographs have been made, however, for only a minor part even of these countries.

There has been but little aerial photography in the mountainous areas and the sections east of the Andes in Colombia, Peru, Bolivia, and Brazil. These are unsettled regions where investigation of natural resources has been less urgently needed. The need for completing the coverage will grow as time passes and settlement advances. In any event, it is essential as a basis for the formation of long-range agricultural planning.

In 1962, it was estimated that 36 percent of the land in Latin America had been mapped at a small scale; 10 percent at a medium scale; and a little over 1 percent at a large scale (58, 62). Since that time there has been appreciable progress in some countries, but there is still much to do to provide information needed for long-range agricultural planning and for cadastral surveys.

Topographic Mapping

Small-scale topographic maps at scales of 1:1,000,000 to 1:100,000 are used for reconnaissance surveys and for the description of natural conditions in a broad manner. Maps at a medium scale of 1:100,000 to 1:25,000 are needed for most soils work, geological studies, and similar purposes. Large-scale maps of 1:25,000 or more are used for detailed soils studies, cadastral surveys, and irrigation projects.

There are small-scale topographic maps of all the Latin American countries, although many of these were made some years ago by methods not very precise.

Medium-scale topographic maps are available for most of El Salvador, Haiti, and the Dominican Republic, and for 40 to 60 percent of Mexico, Colombia, Venezuela, Chile, and Argentina, or at least for the settled regions.

Large-scale maps have been made for the agricultural sections of El Salvador, Haiti, Nicaragua, Colombia, and Panama. Coverage for most of the other countries is inadequate. The Regional Report of the CIDA Inventory estimated that, for the Latin American region as a whole, the coverage for small-scale topographic maps was about 60 percent; for medium-scale, 18 percent; and for large-scale, 20 percent.

Soils Mapping

Dependable maps of the general characteristics of soils are necessary as a basis for general agricultural planning and also for counseling farmers as to desirable cropping patterns, fertilizer requirements, and related problems. The greater part of Latin America has been covered only with very general reconnaissance surveys. In many areas, there are serious difficulties in the preparation of even semidetailed soil maps at scales of 1:100,000 to 1:25,000.

Even more detailed maps are needed as an aid to agronomic extension workers and to farmers in orienting agronomic advice to their specific farms. These require maps of 1:25,000 or larger.

High-quality reconnaissance mapping is complete for Guatemala and Panama, for half or more of Honduras and Venezuela, and for smaller portions of the other countries. There are medium-scale maps for about 15 percent of El Salvador and Panama and 8 percent of Haiti. Such maps are available for between 1 and 5 percent of Costa Rica, Mexico, Colombia, Argentina, Brazil, Chile, and Venezuela. For the remaining countries, such coverage is less than 1 percent.

In 1963, it was estimated in the CIDA Inventory--that Latin America had the following coverage with soil maps:

<u>Map type</u>	<u>Percent covered</u>
Reconnaissance (small scale)	6.0
Semidetailed (medium scale)	3.5
Detailed (large scale)	0.5

Until more work is done, the areas to which agronomic advice can be applied must be determined by farmers' experience, plus the fragmentary programs at experiment stations, as already mentioned. At present, even when fertilizer requirements have been

determined, there is often uncertainty as to the geographic limits within which the results can reasonably be applied.

Land Capability Mapping

Maps of natural vegetation are helpful in indicating which types of crops are likely to do well on a given piece of land and which ones are likely to encounter natural difficulties. Such maps have been produced for some regions, such as Venezuela, Chile, and Guatemala, but usually at a small scale. There are general ecological maps for Peru, Colombia, and Central America, and one is in preparation for Ecuador. These are at a scale of 1:1,000,000.

General land capability maps have been made for Chile, Venezuela, Honduras, and Peru. Semidetailed (medium-scale) maps are available for Argentina, Brazil, Chile, Bolivia, Colombia, El Salvador, and Panama, and a more detailed (small-scale) map is available for Nicaragua.

Most of the earlier land capability maps were based chiefly on soils surveys. Maps for Argentina and Colombia, however, are taking into account climatic and other influences. These influences are also noted in maps of homogeneous physical resources prepared for the Central American countries under an agreement between Secretaria Permanente del Tratado General de Integracion Economica Centro-americana (SIECA) and Regional Organization for Central America and Panama (ROCAP). These maps were published in 1965 in the General Inventory of Physical Resources (GIPR) atlases by the U.S. Army Map Service. Such material is needed for each new area before it is opened for settlement, and for older regions that are to be subjected to development programs.

Cadastral Surveys

One impediment to agricultural progress in Latin America has been the lack of cadastral surveys in a large part of the area. These involve the establishment of boundary lines for each piece of property and determination of its value. Without determination and registration of boundaries, the farmer is likely to find that there are overlapping claims to his land. If there are, he is unlikely to run the risk of making any very heavy investments in improvements for fear that he may lose the land.

Moreover, the cadaster is important both to farmer and to government as a means of providing an equitable basis for assessment of taxes. Where there is uncertainty about land titles, however, government agencies have difficulty both in levying and in collecting the property taxes that are needed for building and maintaining schools and roads, and providing other public services.

Property boundaries are usually well established and legally recognized in the older and more intensive agricultural regions. But there are many overlapping claims and legal controversies in the more recently settled regions.

In Argentina, property boundaries are well defined in most of the Pampas region, and surveys are being carried out in the provinces outside this area. In Chile, a survey was made of the agricultural area around Santiago in 1949-51, and an aerial photographic survey of the central part of the country will provide the base for most of the rest of the agricultural section.

In Brazil, there is no cadaster, but properties must be registered to obtain loans or various benefits from the government. Basis for a cadaster is being established as part of the agrarian reform program. In Peru, the large properties in the coastal region are well defined, but there is no general survey. In Venezuela, provision has been made for a survey but it is not far advanced. Colombia has made various efforts to establish such a survey over the past 30 years but has not carried it out. There is no survey in Mexico, although the boundaries of the ejidos (communal farms) are usually well defined.

In Central America, there are various registers of land ownership in the five republics but no general system. Consequently, evasion of taxes is common in some areas. There is, however, a project for a cadastral survey of Costa Rica, Honduras, El Salvador, Nicaragua, and Guatemala with cooperation of the governments and of Inter-American Geodetic Service (IAGS), SIECA, and AID. It is expected that about 10 years will be required to complete the work.

Realization of the importance of a general property survey is now widespread. In a majority of the countries, however, its accomplishment is still delayed either by legal difficulties or by inertia.

Other Information

There are several other types of information on natural resources that are of direct or indirect benefit to farmers. One of these that is particularly important, especially in irrigated regions, concerns the hydrological resources. Data concerning stream flow and its regularity require a network of hydrological stations on principal streams.

In 1962, it was stated in the ECLA study that adequate stream gauge coverage existed on 37 percent of the area in Uruguay; 31 percent in El Salvador; 28 percent in Honduras; 20 percent in Nicaragua; and 12 to 19 percent in Argentina, Brazil, Dominican Republic, and Mexico. Information on the supply and rate of recharge of subsurface water is even more deficient.

Only about one-third of Latin America is adequately covered with meteorological stations. These are usually located in the vicinity of the capital or other large cities and do not provide enough information for agricultural purposes. For areas that are likely to be settled or developed further, such as the Llanos of Colombia, central and northern Brazil, and the regions along the eastern slopes of the Andes, much more adequate climatological records will be needed than those now existing.

New Settlement

New and unsettled lands in Latin America can provide employment for many thousands of new farmers during the coming years.

There is, of course, no absolute supply of agricultural land. The amount that is wanted and the prices which the market will pay for it depend on the demands for farm products and the production methods that are to be used. Invention and modification of methods of farming tend to lower the intensity of such demands while, on the other hand, the continuous growth of population increases them.

The land that is still unused or that is used only by very extensive methods may become more useful as new techniques are developed and as production costs are decreased. Thus, the development of methods for planting and harvesting crops between annual floods on the flood plains of the Amazon might make such areas highly valuable or the development of methods of dry farming for the western part of the Chaco or for other semiarid areas might extend cultivation in those regions.

The unsettled lands of Latin America vary widely in physical characteristics as well as in their economic situations. The Amazon basin above the flood plains is covered chiefly with poor and leached out soils, although there are also scattered areas of relatively good land. Whether or when such land is put to use will depend on available technology and transportation facilities.

South of the Amazon region lies the central plateau of Brazil, which is covered largely with scrub forest or with scattered trees and coarse grasses. A reconnaissance of part of this region by technicians of the American International Association and the U.S. Department of Agriculture classified 757,000 square kilometers (roughly 19 million

acres) into five classes of descending productivity--from potentially good cropland (class I) to land unfit for agricultural use (class V), as follows (2):

<u>Class</u>	<u>Thousand square kilometers</u>	<u>Percent</u>
Class I	115	15.2
Class II	151	19.9
Class III	236	31.2
Class IV	47	6.2
Class V	<u>208</u>	<u>27.5</u>
Total	757	100.0

The soils in the region are of old formation and most of the plant food has been leached out. Crop production will require application of lime, phosphates, and other fertilizers. These are expensive in the area, largely because of high transportation costs. Expensive transportation also lowers the value of the products of the area. Settlement is, therefore, dependent largely on development of transportation facilities and on favorable price situations. For the immediate future, the most advantageous use of most of the central plateau will be for grazing cattle--a product that can walk to market.

Farther to the southwest lies the Gran Chaco. This region varies from swampy flood plains in northern Argentina and southern Paraguay to relatively dry lands nearer the Andes. The vegetation shifts from heavy woodland in the southern Chaco to scattered trees and coarse grass farther north. Much of the Argentine Chaco has already been converted into a productive cotton belt, and the greater part of the Paraguayan Chaco is used as an extensive grazing land. There are, however, a few settlements where dryland farming is practiced successfully, especially in the Mennonite colonies. The requirements for the Chaco thus seem to be further development of dryfarming methods combined with ranch cattle production, plus better transportation.

Still other conditions occur in eastern Paraguay where the rolling upland possesses, for the most part, good soils covered with dense forest (selva). This area, which is being colonized, requires chiefly clearing of the forest and construction of roads. The clearing process, however, takes a substantial amount of work. It requires several years for a small farmer to prepare a new farm for normal operation. In addition to the work required to prepare new farms for operation, roads must be built to give the farmers access to markets. Furthermore, successful settlement requires that price relationships be favorable.

Similar conditions, on a much larger scale, occur in the foothills of the Andes and in areas extending eastward from the mountains in Bolivia, Peru, Ecuador, and Colombia and in areas in Guatemala, Nicaragua, and Honduras. In most of these areas, little is known about the soils or the potential productivity of the land.

Most of the unsettled lands are in the hands of the governments, sometimes of national governments, or sometimes, as in the case of Brazil, of state governments. Members of these governments are usually anxious to get the lands settled, and, of course, to obtain funds from the sale of these lands for their depleted treasuries. Often the buyers are urban investors or speculators who want to invest funds in real estate to avoid the effects of inflation. The land usually has no access roads and the economic situation is seldom favorable to its immediate utilization. Consequently, much of it continues to lie idle or, at best, to be used as range for cattle.

An illustration is found in the state of Mato Grosso, Brazil, where land has often been sold merely by its identification on a map. Sometimes the buyer may hire an airplane to fly over his new land because of lack of roads. Needless to say, selling land in this way does not make for orderly agricultural development in the future. The buyers frequently know nothing about agricultural technology, while the managers who they employ know only the traditional and primitive methods of the area from which they come.

New lands may be brought into use as normally organized farms either by very small farmers or pioneers, or by owners of large tracts. The latter may be either absentee investors, such as those mentioned just above, or large resident operators. Large resident operators achieve a more systematic and efficient development. To do this, they must have sufficient capital to employ labor in making needed improvements, such as clearing land, building fences, and constructing the necessary buildings; moreover, they must live on and manage the land until it begins to yield an adequate current income. The very small settler usually has very little capital and is forced to use primitive farming methods. Consequently, he faces a life of hard labor and many privations.

The most numerous settlers, although occupying but small areas of land, are the squatters. They settle on small, unutilized patches of land and proceed to clear small areas where they plant maize, mandioca, bananas, and other crops, chiefly for their own subsistence, and gradually expand their holdings to include the surrounding jungle. It has been estimated that there are at least a half million of these squatters, without land titles, in Latin America (62). The number increases by tens of thousands each year.

Settlement Process

Relatively little attention has been given to the process by which the forest is converted into pasture or cropland. The most pertinent information on this subject is found in three short studies made by the Inter-American Institute of Agricultural Science of colonies in eastern Paraguay (77-81). Typically, clearing is done by hand. First the trees and underbrush are cut, limbs are lopped off the trees, and the mass of vegetation is allowed to dry. Toward the end of the dry season it is burned, leaving the ground covered with a layer of ash. This adds to fertility and serves to correct the acidity of the forest soil. Consequently, the first two or three crops return a high yield from the accumulated or virgin fertility plus the ash. In addition, immediately after the land is burned over, the soil is in a very friable condition and requires no plowing or other work before planting.

In the second and third year, however, yields decline. Difficulty of operation develops also from the growth of grasses and weeds. These are soon beyond the control of the small settler or squatter, who usually has no implements but a machete and hoe. About the third or fourth year, therefore, he frequently decides that it will be easier to abandon his first clearing and start over by clearing another patch of land.

This is a process that is common not only in Latin America but also in tropical regions in other parts of the world. It might seem that it is highly destructive of forest resources. Although this is true in a physical sense, it has seldom been found profitable to attempt to market any large part of the wood in such forest. There are usually hundreds of varieties of trees on each area of a few hectares. The number of high-quality logs available is small and most of the material is of little or no commercial value. Furthermore, the settler's land is usually far removed from sawmills and markets for timber. Consequently, an effort is made to save only the highest quality timber. A small amount may be made into charcoal. The rest is burned as the cheapest means of getting it out of the way.

Labor requirements in clearing and burning over land covered with heavy forest were estimated in eastern Paraguay at 60 to 80 man-days per hectare. In 1964 and 1965, such labor was paid wages equal to \$0.80 to \$1.00 a day. The clearing process thus cost around \$40 an acre. Although mechanical equipment is capable of reducing the number of man-days, the capital cost and tractor fuel used in mechanical clearing usually bring the total cost above that of hand clearing. Consequently, even on large, newly established farms, hand methods are usually the ones selected.

After his land is cleared, the settler still has much to do before he has anything like a farm. Under the conditions in Paraguay, he is usually able to clear about 2 hectares

(5 acres) the first year in addition to building a shelter for himself and his family. The second year, with an area of crops competing for his time, the area he clears is smaller than that cleared in the first year. The third year, with a larger area in crops and with rapidly growing weeds to combat, the increase in area is usually quite small. As long as he continues to use hand methods, the maximum he can cultivate is about 4 hectares (10 acres).

If the settler is able to buy a yoke of oxen, he can somewhat increase the area handled. If he can get enough capital to buy a cow or two, he can turn the earliest clearing into a pasture and plant crops on newly cleared land.

Four or 5 years are required for the larger roots of trees to rot out of the topsoil. Until that time, oxen, which are less excitable than horses, are usually preferred as workstock among the stumps and rotting logs. Their slow movement, however, prevents plows and other implements from moving fast enough to pulverize the soil thoroughly. Hence, oxen are less effective than horses in controlling weeds. About the fourth or fifth year, many settlers try to obtain a pair of horses to replace the oxen. After this, it becomes somewhat easier to expand the crop area and advance in development of the farm. Many, however, fail to get past the first or second stage of development, and continue to operate units too small to provide adequate support for a family.

The Mallorquin colony in eastern Paraguay was founded in 1958, and had 998 settlers in crop year 1963-64. Farms of 984 of these settlers averaged 22.8 hectares, and of the other 14, 72.6 hectares. Each of the larger farms included about 32 hectares of open land, usually of low quality. After 4 years, the smaller farms averaged about 4.5 hectares in crops, and the larger ones, 10 hectares. Principal crops in the group of small farms included an average of 1.4 hectares of maize, 1.1 of mandioca, 0.6 of cotton, and 0.4 of tobacco. Principal crops for the larger farms were maize with 3.2 hectares a farm; mandioca, with 2.4 hectares; cotton, with 0.4 hectare; tobacco, with 0.1 hectare.

The larger farms, with more pasture, had more livestock than did the smaller ones. Animal units of cattle per farm averaged 0.3 on small farms and 11 on larger farms.

Difficulty in obtaining capital for workstock by the smaller farmers is indicated by the fact that the small units, 4 years after settlement, averaged only 0.24 ox and 0.1 horse per farm, compared with 1.0 ox and 2.1 horses on the larger farms.

These figures are quoted to illustrate the rate of progress actually made by settlers on small areas of virgin forest, even with some help from their government. For most settlers of this type, a laborious life lies ahead. Their principal inducement for undertaking the life of a pioneer is usually found in their desire to build up a heritage for their children rather than in their expectation of deriving large current earnings from their land.

Progress of Settlement

In general, the Latin American countries have made little progress toward the use of their idle lands. Most of the settlements have been spontaneous ones. The squatters have continued slowly to penetrate the jungles with virtually no help, often with opposition from their governments. Settlement in larger units by private individuals has probably brought greater areas of new land into use, again with little help or guidance from governments.

It is true that there have been efforts at planned settlement under government auspices. These have met with varying degrees of success. When conducted under public control, the settlement projects have seldom been highly selective of settlers. Consequently, the percentages of families abandoning their plots have usually been high. The land assigned to new settlements has often been unsuited to farming, and the plots per family entirely inadequate to provide a living. In addition, the projects have usually been designed more by social workers than by persons with a knowledge of farming.

Consequently, they have usually provided roads, schools, hospitals, social centers, shopping centers, and all facilities considered desirable in an urban community. Where this is done, there is a high cost per settler, not infrequently running to the equivalent of \$10,000 to \$20,000 a family. Finally, the planned settlements have nearly always been very small and have provided for settlement of a few hundred families where opportunities for thousands were needed.

An exception, in many ways, is found in Paraguay which has adopted a more practical system. For a number of years it has had legal provision for establishment of colonies on its abundant unoccupied lands. These may be established either by private individuals, companies, or public agencies. In 1965, there were over 200 colonies in the country. Most of the colonies are merely groups of a few families who have squatted on unoccupied land. Recognition of such nuclei as colonies brings them under a certain degree of government control. Such control is provided by the Instituto de Bienestar Rural (Institute of Rural Welfare); this agency, however, has given the settlers but little guidance or assistance. The Government has made an effort to induce large numbers of families to move away from the congested region of minifundia around Asuncion and settle on new land.

In 1966, government efforts were being directed toward improving large colonies established along recently constructed highways. One of these runs northward from the town of Colonel Oviedo, which is about 50 or 60 miles east of Asuncion.

Along this road, 12 official colonies and two private ones reported something over 8,000 settlers on 118,000 hectares in 1965. Along a second road, running eastward from Colonel Oviedo, there were 11 official and 4 private colonies with parcels assigned to 10,000 settlers on about 360,000 hectares. Not all of this land is yet occupied. There were also many squatters in the region who had not yet been legally recognized or assigned lots. The families on assigned lots often included relatives as well as members of the immediate families, averaging over six persons per parcel. Thus, the official colonies contained 75,000 or 80,000 persons, and the private colonies, some 30,000. There were estimated to be 50 percent as many outside the colonies.

In these colonies, access roads were either very bad or nonexistent. Schools were available for not over half the children. Health conditions were very bad and there was a serious need for health centers where medical attention could be obtained. The settlers, typical of spontaneous settlers throughout Latin America, were very poor and had but few implements or animals. Credit for development of the farms was limited and was actually available to only a small percentage of the settlers.

Assistance was being promised, however, by a loan of some \$6 million for the colonies east of Colonel Oviedo from the IDB, an institution that had also extended several million dollars of credit to the country for other agricultural purposes. Six million dollars, however, when divided by the number of families in the public colonies (between 8,000 and 9,000), amounted to only around \$700 a family, and this had to cover construction of access roads as well as credit to the settlers themselves.

It may be that settlers under these conditions are stimulated by the very difficulties they face. In any event, in 1966, a majority were showing commendable energy in clearing land and planting crops.

Bolivia, with its overcrowded upland and abundant land in the plains, is badly in need of an effective resettlement program. An increase of 600,000 is expected in the rural population in the 10 years, 1962-71. Of this increase, the paper stated, 550,000 should be resettled in the Llanos. Inhabitants of the highlands, however, show little inclination to move into the tropical or subtropical lowlands.

Various aspects of the resettlement problem are handled by the Army, the Resettlement Agency of the Ministry of Agriculture, and the Bolivian Development Corporation. There is, however, no integrated settlement program. Some colonies have been organized under the various government agencies and some under various international agencies,

and others have grown up spontaneously. The varying success or failure of these colonies illustrates the complex problems involved, but hardly points to any simple solution.

Two settlements, organized under direction of the Army and the Development Corporation, respectively, were relative failures. Another settlement, organized by an international agency, and with the highest investment per family, likewise failed; in 1962, only 80 of the original 320 settlers remained in it. A small Mennonite settlement was one of the most successful settlements. A Japanese colony organized under a contract with Japan was also successful.

An Okinawan colony which was located on good soil and which had a strong cooperative organization and the assistance of AID was considered highly successful. Another colony with technical guidance and located near markets was also rated as successful. So were two or three others near the Santa Cruz Market; these were on good soil but did not have assistance from AID. The percentage of settlers remaining in the colonies varied from 100 to 25.

In Peru, there were very large areas of unsettled land east of the Andes. Information on the capability of this land is scarce. Meanwhile, population pressure in the uplands is high, area of tillable land per family is small, and income levels of the farm population are very low. The government is actively following a policy of increasing the irrigated area along the Pacific coast and building roads over the mountains to open up the eastern valleys and lowlands. Construction costs of such roads are high, and the cost of shipment of farm products three or four hundred miles over a high mountain range even with roads would leave little profit for the producer. Nevertheless, there is much to recommend in the proposal made by Peruvian President Balaunde-Terry that a highway be built along the eastern foothills of the Andes from one end of the country to the other in order to open up this region.

Unfortunately, most population growth has occurred along the Pacific coast, in the western valleys, and in the highlands. Very little population has become established to the east. Development of population centers in the eastern area would no doubt be accompanied by a rapid development of the eastern valleys and lowlands.

Several large settlement projects in the eastern region are under development or consideration by the government. In addition, Peruvian businessmen are purchasing land and trying to develop agricultural enterprises in the region. On one large concession, Tournavista, an effort is being made to apply very heavy, large-capacity equipment to the land-clearing process.

Until recently, the people of the sierra have shown relatively little inclination to move into the hot and humid lowlands. They have been, however, apparently becoming more mobile, and increasing numbers were looking for employment or settling on the eastern slopes of the mountains during the mid-1960's.

Farther north, in Colombia, conditions vary from forested regions to open grasslands of the Llanos which extend into Venezuela. The soils of the Llanos are poorer than those in the forested region farther south. In addition, much of the Llanos is subject to flooding in the rainy season and to drought in the dry season.

Colombia has no general plan for colonization of its unsettled lands. There are, however, several areas that are receiving some support through the Caja de Credito Agrario (Agricultural Fund). The lands suitable for settlement are more accessible than the lowlands of Peru. Consequently, relatively more private development is underway.

In Venezuela, there have been efforts to colonize and develop new lands for many years, and considerable sums of money have been spent on colonization projects. In late 1962, it was reported that 52,000 families had been settled on 1.5 million hectares. It was also reported, however, that the percentage of settlers abandoning their plots was quite high. This apparently resulted from their low income and from the better opportunities available in the petroleum and other industries.

In Brazil, there have been a large number of agricultural settlements, several of which were established by or for European or Japanese immigrants. Only the Japanese settlements have been highly successful. The reasons for failure of the European settlements have been chiefly ill-adapted land, ill-adapted settlers, insufficient capital owned or available to settlers, and plots too small to provide adequate family income.

With its great area of unsettled lands, there has been less pressure in Brazil for government settlement projects. Largest colonization projects are those planned under the Superintendencia do Desenvolvimento do Nordeste (SUDENE). This organization was founded in 1959 to work out and administer plans for development of the great northeastern area of Brazil that is periodically affected by serious drought. The principal colonization plan is to establish settlements in the state of Maranhao. Plans were also made for development in the coastal region in southern Bahia.

Each of the Central American countries has an agency of some type that is responsible for settlement of unused lands or for improvement in use of land already settled. Each, except El Salvador, has an appreciable area that could be settled.

The largest project reported was the settlement of some 4,900 families on government land in Guatemala in 1955. Plots assigned averaged about 20 hectares, and cost was about \$4,000 a farm. The farms have been relatively productive in comparison with similar small Guatemalan farms. The settlers, however, need roads and additional credit.

In Nicaragua, the government has plans for establishing several colonies of small farms and also for developing an area of large units in eastern Nicaragua for production of crops and of beef cattle.

In Costa Rica, principal activity has consisted of a program for regularizing the status of some 20,000 to 25,000 squatters and for granting them titles to their land.

A large amount of land in Latin America could be brought into agricultural use, either for crops or for cattle production. Governments have been slow to inventory the region's resources and to develop practical programs for their utilization. Information is commonly lacking on the characteristics and capabilities of the unsettled land. Roads are needed as well as experiment stations and demonstration farms to determine what the new lands can best produce. Credit for farmers is also lacking, although this is part of the general scarcity of capital throughout the region.

Most of the increase of population in the new areas seems to have come from the spontaneous settlers or squatters, although these have occupied very small plots per family or in total.

Most of the new lands can be put to use better by settlers with somewhat more capital and with larger areas per farm than by the squatters. Settlement of small plots in the government-sponsored colonies helps in some measure to relieve the distress of some of the disadvantaged rural population, but it does not add much to the volume of agricultural production. Where more production is wanted, it can be obtained at lower financial and human costs through programs that make land and capital available to farmers for developing medium-sized or large farms.

Land Tenure

There are many forms of tenure under which land is held in Latin America, as might be expected in such a large region. Most of these can be grouped under four or five common headings of ownership and tenancy, although they differ with types of crops, size of farm, and farming practices.

One distinctive form of tenure in the region is the ejido, in which land is held in common by a group of farmers or a village. The structure of the ejido and its relation to the national government vary from one country to another. The land, however, cannot be sold or otherwise disposed of by the individual. Assignment of plots is usually by an

ejido council which also passes on admission of new ejiditarios and disposes of a plot upon the death of a member. The land may be operated by the ejido in common or, more often, is divided into plots which are assigned to individual members.

Ejidos are of importance in five countries listed in appendix tables 8 and 9: Ecuador, Honduras, Mexico, Peru, and Nicaragua. Holding of land by communal groups occurs also in Bolivia, which is not shown in these tables. The ejidal system is most important in Mexico, where the 1960 census reported 1,398,000 ejiditarios (communal farmers), compared with 1,345,000 private farmers. The Mexican ejiditarios held 32 percent of the total land in farms.

In Honduras, approximately one-third of the farmers are ejiditarios, and these hold about one-fourth of the farmland. Elsewhere, the operation of land by communal groups is less important; about 8 percent of the total farmers in Nicaragua, 5 percent in Peru, and 2 percent in Ecuador are members of such groups.

In most Latin American countries, the percentage of farms operated by owners is above 60. There is, however, some difficulty in interpreting the percentage figures. The group of owners includes those on nearly all the very large units and also on a high proportion of the very small ones. Of the very small farms, a high proportion seem to be owned by part-time farmers, including laborers whose principal income is obtained from employment on larger farms nearby.

In Argentina, the 1960 census reported that 59 percent of the farm units were privately owned and 17 percent consisted of fiscal or government-owned land. In Mexico, slightly more than half the total number of farms were in ejidos; of the remainder, 96 percent were privately owned. In Honduras, 34 percent of the total number of farms were in ejidos, and 21 percent were privately owned. In Peru, the corresponding figures were 5 and 67 percent. Farms operated by hired administrators are reported for only five countries, although it is known that they are of importance in others as well. Where an indication is given, these are shown to be among the very large units.

One interesting group that has been mentioned before consists of the farms for which the operators have no title. These farms are usually, but not always, quite small. The group includes 62 percent of the farms in Panama; 42 percent in Paraguay; and 10 to 15 percent in Brazil, Guatemala, Honduras, and Nicaragua. It probably includes more than 13 percent of the farms in Venezuela since 13 percent of the land in farms is reported to be held without title. Such farms are not reported for four countries, although they probably exist in all the countries listed.

In Uruguay, 33 percent of the farms and 29 percent of the farmland were reported to be operated under renting arrangements, mostly for cash rent. In Colombia, Dominican Republic, El Salvador, and Guatemala, between 20 and 30 percent were rented. The same range probably applies also to Argentina and Chile, although the figures for numbers of farms were not available. The form of rental contract was not always indicated. Where shown, cash rent predominated.

Operation by laborers attached to large farms was reported for seven of the 17 countries. These or other types of laborers are common in most if not all of these countries (35, 36, 58, 71-74).

Farm Size

There is undoubtedly an optimum size of farm business under each complex of natural conditions, capability of farmer, and combination of resources. Area of land within this combination of resources may vary widely depending on type of farming followed and equipment used. Thus, on productive land, a fruit, vegetable, or poultry farm may consist of only a few acres. If the farm is devoted to production of beef cattle or sheep, it may consist of several thousand acres. The area needed will, of course, vary also with the type of land and with the amount of rainfall.

Size of business, however, is measured in more dimensions than the mere area of land utilized. The amount of labor employed, or the amount of capital including equipment, livestock, and operating capital, provide other means of measuring size of business. So does the rate of turnover, which depends largely on type of farming.

Selection of enterprises and the identity of crops produced will be affected, therefore, by the area per farm, the availability of capital, the type of soil and climate, and, of course, the relative prices of the alternative farm products.

Determinants of Farm Size

The farmer with a small area of land and little capital has a much more limited choice of crops than does the one with a large area of land or with access to ample funds. In addition, the very small farmer is more likely to be ignorant of technological and economic opportunities and consequently less capable of choosing the most advantageous combination of crops and livestock. His poverty is thus aggravated by poor internal organization of the small farm that he has. His farm, if organized as efficiently as possible for its size, will likely contain a high proportion of land in labor-intensive crops such as potatoes, vegetables, and fruits. His livestock also will usually consist of labor-intensive types such as poultry, milk cows, and hogs. He will have but little land devoted to pasture or forage crops and little planted in cereal or other crops such as soybeans that require large-capacity equipment for harvesting, and he will have very few beef cattle.

Some such trend in organization is usually observable in areas of minifundia, in small farms around cities, and in the satellite farms held by laborers living on or near large estates.

It is often said that small farmers fail to organize their farms in the manner described and tend to imitate their larger neighbors in selection of crops. Closer examination usually shows that the small farmer tends to organize his farm in a rational manner, but that he often does not deviate from the organization of his larger neighbor as far as would be in his best interest.

The internal organization of the large farm is usually quite different from that of the very small one. The same principles of choice apply, but the difficulty of administration as the business becomes larger also has a bearing on choice of crops. Thus, the large farm is likely to have a high proportion of its land in pasture and forage as well as wheat or other labor-extensive crops. This is partly to avoid overcropping the poorer or rougher land, but partly also because these extensive uses are easier to administer and require less employment of labor than do the intensive crops such as coffee, sugarcane, and potatoes.

Where natural and economic conditions are especially favorable to some single crop, especially to a labor-intensive crop, the farm structure is usually simplified to ease the administrative problems. For example, the sugarcane plantation usually contains but small areas of any crop other than cane, except perhaps pasture for draft animals. On large Argentine farms, administration is simplified by keeping the bulk of the land in pasture.

Under these conditions, selection of enterprises is affected by the pattern of land-holding. Had the Argentine Pampas been divided into farms of a few hundred hectares, rather than several thousand, much more area would undoubtedly have been planted in cereals rather than pasture during recent decades.

Where the land is poor, steep, or rough, there is a tendency to utilize it in a more extensive manner. Steep land that is fertile, however, may be used for coffee farms. Where land is semiarid, it is necessary for a farmer to operate a large area to make a living. The structure of the agricultural unit must be modified accordingly. Thus, the large units found in semiarid parts of Argentina, such as San Luis and Las Pampas

provinces and in Patagonia as well as in the drier parts of Brazil and in the Llanos of Colombia and Venezuela, are to be explained on a quite different basis from those in the vicinity of Buenos Aires.

Variations in size of farms are necessary for maximum national production and for optimum returns to the farmers themselves. This is true whether size is measured by area of land or by the volume of business. Such a statement, however, does not justify the extreme range found in many areas of Latin America.

As pointed out, the land itself varies from arid to swampy, from highly fertile to almost completely sterile, from mountainous to level, and from locations adjacent to large consuming centers to others thousands of miles from them. No satisfactory means of quantifying the productivity of land has been developed. Thus, it is apparent that an equal volume of production might require many times as great an area in one case as in another.

Another important consideration is that the productive capacity of farmers varies as much as does that of land. Here again, no satisfactory measurement is possible, although it is clear that one farmer may be able to operate a farm of 500 acres as easily as his neighbor can handle 50.

A third consideration is that land does not produce an economic return by itself, but must be used in conjunction with labor and capital in forms and amounts which are correct for each situation. Thus, a fruit farm or poultry farm requires a large amount of capital and labor per acre, but beef cattle may be produced on pastureland, with little or no improvements and a low labor input. Thus, any program that aims at equal areas of land for different farmers would be highly uneconomic.

In Latin America, there are the added problems of inadequate education for the farm population and a severe shortage of capital. Both of these influences impede the development of adequate farms even by a majority of men who might make capable farmers under more favorable circumstances. The result is a high percentage of minifundia or dwarf farms.

Size Variations

Comparable data on sizes of farms are available from recent censuses in 15 countries (appendix table 8 and fig. 3) (58, 70, 87, 88). In 11 of these, more than half of the enumerated farms were under 10 hectares (24.7 acres). There were three countries in which over 90 percent fell in this size group--El Salvador, Peru, and the Dominican Republic.

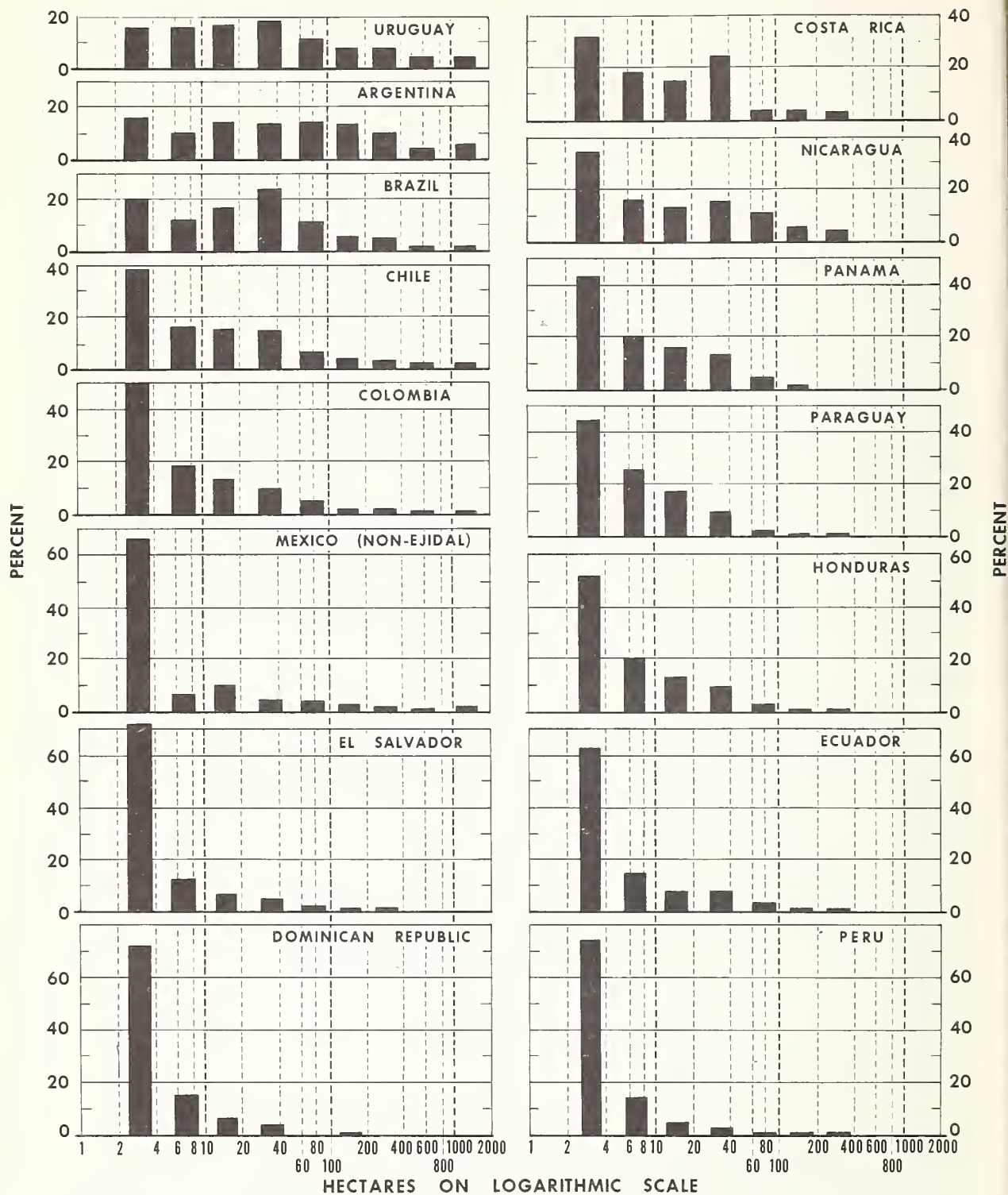
Farms of under 10 hectares, however, occupied less than 5 percent of the farmland in seven countries, from 5 to 10 percent in two countries, and over 10 percent in only four--Ecuador, El Salvador, Honduras, and Panama.

The adequacy or inadequacy in area per farm depends, of course, on the type of farming followed as well as on the type and location of land. Ten or even 5 hectares of good, irrigated land might be adequate to provide employment and a satisfactory income if used as a vineyard, vegetable farm, citrus grove, or poultry farm.

The farms of 1 hectare and most of those of 5 or 10, however, are inadequate to provide a satisfactory living if used to produce such crops as maize, wheat, cotton, or most other common field crops.

The question arises as to how many of these very small parcels of land actually do provide the sole source or major source of income for the families living on them and should be considered as farms in the ordinary sense. Many are known to be occupied by families that obtain a large part of their income from employment elsewhere. An unknown proportion are clustered around towns or cities where they provide part-time employment for some members of the families. Some of the farms provide the sole source of employment for the families living on them and represent very intensive form of agriculture. A

PERCENTAGE DISTRIBUTION OF FARM UNITS OF OVER ONE HECTARE



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high proportion of the farms represent genuine minifundia and are the source of all or most of the income of the families living on them, either in cash or produce used for subsistence. These families unquestionably require assistance. It might be provided by helping them to move to other locations where they can farm larger tracts of land, or even better, by helping them to shift into other occupations.

Unfortunately, we do not know the proportions in these different groups. There are very few data on sources of income of farm families. Data from the CIDA Land Tenure Study in Colombia showed that family income in groups of farms in the Cauca Valley varied closely with area of the farms, but it gave no information on the income received from outside employment.

The corresponding study in Peru in the early 1960's showed that in samples of family-sized farms, net cash income averaged the equivalent of \$807 in coastal regions, \$189 in the sierra, and \$1,027 in the selva. Average size of the farms covered was 5.8 hectares in the coastal region (mostly irrigated), 15.7 hectares in the sierra, and 15.3 hectares in the selva. To this was added income from outside employment equivalent to \$63, \$189, and \$187, respectively.

On corresponding groups of subfamily farms which averaged 1.8 to 3.6 hectares, net cash farm income was the equivalent of \$342, \$172, and \$322 in the coastal, sierra, and selva areas, respectively.⁷ To these sums, outside employment added the equivalents of \$187, \$97, and \$121.

It is interesting to note that the operators of the family farms earned nearly as much from outside employment on an average as did those of subfamily farms. This suggests that the 15 or 16 hectares in each of the family farms was not enough land to keep the families busy the year around. Outside earnings on the subfamily farms, however, were much more important than on the larger sized farms as supplements to income. In the subfamily groups, outside income added 38 percent to cash income in the selva area and 55 and 56 percent, respectively, in the coastal and sierra areas. On the slightly larger family farms, the addition was only 18, 8, and 38 percent, respectively.⁷

The group of very large farms--those over 500 hectares--is very small, rising as high as 9 percent of total farms only in Argentina. In 9 of the 13 countries shown in table 9, it accounts for less than 1 percent of the total.

The amount of land held in these few very large units is out of all proportion to their number. In Mexico, which had an agrarian reform some years ago and where 2.7 percent of the privately owned farms are larger than 500 hectares, this group in 1960 held 84 percent of the farmland. The figure is above 80 percent also in Argentina, Chile, and Paraguay. It is over 70 percent in Peru and Uruguay, between 40 and 50 percent in Brazil, Colombia, Ecuador, and Guatemala.

No doubt many of these very large units exceed the areas that are either socially acceptable or economically efficient. Some of them consist of good land that has been handed down by inheritance from generation to generation. Some consist of large areas recently purchased by urban investors. As a rule, neither of these subgroups represents very desirable enterprises.

⁷ The CIDA classification into family and subfamily farms is too imprecise to be of much use for analytical purposes. A farm may be so classified by CIDA on the basis of the amount of employment it provides or on the income which it yields--two quite different criteria. Both will be affected by the number, age, and health conditions of the family members. Whether the income is adequate will depend on the family's standard of living. Whether the farm provides full-time employment will depend on the type of farming followed and on the type of equipment possessed--whether it consists of a hoe and machete, oxen and wooden plow, or tractor together with complementary equipment. Both income and employment will also be affected by the type of land in the farm.

Family farms vary also in the amount of labor employed. Many farms of a few hectares hire extra labor during some seasons. In turn, the operator of the small farm frequently works part time for his neighbors.

It should be remembered also that the Latin American idea of a family farm involves the use of much more hired labor than does its counterpart in the United States. This results partly from the greater supply of labor available and lower prevailing wage rates.

All large units should not, however, be condemned out of hand. Not all land in the large estates is good land. There is a tendency for rougher and poorer land to be added to medium-sized or moderately large farms and used as pasture. This is usually a desirable arrangement to conserve land and for maximum long-run earnings.

In some areas, already mentioned, scarcely anything but extensive uses can be made of the land. Examples are found in Patagonia and in western and northwestern Argentina, parts of Mato Grosso and the Brazilian Northeast, subarid and mountainous areas of Chile, some of the sierra of Peru, northern Mexico, and the Llanos of Colombia and Venezuela.

In interpreting data on sizes of farm units, it is necessary to consider also some of the idiosyncrasies of the figures themselves. Thus, the Brazilian census includes land used for forestry enterprises along with that used for crop or livestock production. Farm areas reported for the Amazon region amount to millions of hectares which fall mostly within the groups of very large units. These can scarcely be anything but forested land. These figures are large enough to distort the size distribution for the northern part of that country.

Another idiosyncrasy of the Brazilian statistics appears at the opposite end of the size distribution. This comes from the definition of a farm or agricultural exploitation. According to this definition, where the same man operates more than one parcel of land, these are counted as separate farms unless they are contiguous. This results in overstating the number of operating units and understating their average size. In some other countries, separate parcels of land were counted as separate farms if located in different municipios (counties) or other civil units.

A better classification could be based on cropland per farm (where data are available) rather than total area. However, this would still not be wholly satisfactory since it does not take the quality of the land into account. Also, it would ignore the pastureland which makes a major contribution to farm operation in most areas.

Land Reform

In recent years, the popular slogan among agricultural planners, teachers, and officials has been "reforma agraria." This had to do primarily with breaking up the large landholdings and distributing the land among the minifundistas--farmers with inadequate areas of their own. The obvious fact that much more is needed than a redistribution of land usually forces the reformers to modify the slogan to something like "reforma agraria integral," that is, reform of everything that needs reforming. But discussion soon returns to the core of the reform movement--the redistribution of land.

Of course, the objective of reform must be to improve matters for someone. The typical land reformer in Latin America, however, like other agricultural officials, is an urban dweller. Furthermore, his primary interest is macroeconomics--the structure and functioning of the economy taken as a whole. To him, farmers compose merely one of many groups, and hence, are of secondary interest. This viewpoint differs from the objective of this report, which is concerned primarily with the well-being of farm people. We are not forgetting all the other economic groups, but are merely trying to explain why the farm group requires more favorable treatment than it has been receiving.

Requirements for Reform

We are not concerned here with a discussion of a theoretical model for reform, nor with reform and improvement of agriculture in general, but rather with means of improving the lot of a limited group--the farm population within Latin America--and with the limitations imposed by natural and economic conditions within that area. This makes the

problem more difficult than it would be if we could discuss reform and agriculture under a simplified, hypothetical set of conditions. The economic environment of Latin America is complex. Among the characteristics of the region which affect the tenure and use of land are the following:

1. The region contains numerous pockets of overpopulation where landholdings have gradually assumed a dual pattern. Some holdings have remained large--some, very large--but others have been fragmented by population growth until they are incapable of supporting a family at any reasonable level of living.

2. The large holdings usually employ a great many full-time or part-time workers at very low wage levels. These rates have resulted from the excessive supply of men seeking work within the neighborhoods where they have always lived. In some of the Andean regions, wage seekers are so numerous and wages are so low that men are employed to do work that would ordinarily be performed by horses or by mechanical power.

A man cannot for a protracted period put out physical effort equal to much over one-tenth of a horsepower. When we realize that in these areas his wage is, in effect, being compared with a fraction of the cost of keeping a horse, we can see that the marginal labor product is very low indeed.

3. In most of the overpopulated areas, the small farms exist in a state of symbiosis with large ones. That is, the small farmers are able to make a living because they can add something to their income by working on the large farms when employment is available. This is of benefit both to the small farmer and to the large farmer.

4. The number of workers already employed on the large farms plus the number of nearby small farmers is usually so great that any effort to enlarge the small farms to an efficient working size would necessitate a considerable reduction in the population of the neighborhood.

5. Notwithstanding the critical shortage of land in the crowded regions, there are, in most Latin American countries, considerable areas of land that are unsettled or used only very extensively. Much of this land is, however, of poor quality, lacks roads and other facilities, or is covered with forest. Settlement in such regions is proceeding very slowly, sometimes with the spontaneous effort of squatters and sometimes by men with large capital who may clear and improve considerable areas with the aid of hired labor.

6. Most of the governments are very short of funds. Consequently, they can do but little toward providing the facilities needed in new regions or even in those that have already been settled.

7. The governments have available to them an altogether inadequate number of persons trained and experienced in the various branches of agriculture who could guide and assist new farmers. Those who are available are paid very low salaries; have but few funds for current operating purposes, including visits to farms, and have but few vehicles for travel in the regions to which they are assigned. Even worse, a majority of the technical personnel come from urban origins and have difficulty in communicating easily with farmers or in understanding the farmer's problems as he himself sees them. As a result of these difficulties, there is a high turnover of employees.

The shortage of qualified personnel may be traced in a large measure to the lack of education of farm youth and to the fact that even those farm boys and girls who have been to school have usually attended for only 1 to 3 years. Consequently, they cannot qualify for entrance into secondary schools or into institutions of university level and are usually only capable of carrying on farming systems of a very routine character.

8. The farmer commonly faces the problem of excessively high prices for equipment and supplies. This again runs counter to the avowed intention of governments to encourage greater production, especially greater food production. Here the explanation is that the governments are more interested in encouraging the development and expansion of urban industries than in stimulating farm production and raising income of farmers.

These, then, are the conditions under which reform must be sought, to improve the lot of farmers in Latin America. It is clear that most of them will not disappear with redistribution of land in large estates.

Early Reforms in Latin America

Two agrarian reform movements in Latin America (in Mexico and Bolivia) have had over 10 years to develop. Others are just getting underway in Chile and Venezuela. Another is in progress in Cuba, but is shrouded in so much uncertainty and controversy that very little can be said about it. In Mexico, Bolivia, and Cuba, the agrarian reform occurred incidentally in a political revolution and was not planned in a systematic manner for the primary purpose of improving agriculture or the welfare of farm people.

In each of these three cases, the agrarian part of the revolution gave sanction to a movement already underway. In each case, an effort was made to justify whatever had been or was being accomplished in breaking up large properties. An effort was also made to make the movement appeal to the largest possible sector of the population.

In Bolivia especially, the appeal was wider than to small farmers and farm laborers. Article 77 of the Law of Agrarian Reform provided that land be given to "all Bolivians over the age of 18 years, of either sex, who engage or wish to engage in farming activities."

In Mexico, the agrarian reform, which began during the revolution shortly after 1910 and was recognized in the Constitution of 1917, resulted in the establishment of 19,220 ejidos by 1960. The number of ejidatarios filing claims to land was 2,169,000, but not all of these were granted land. In fact, Diaz Ordaz, then a candidate for the presidency, in 1964, warned the million or more persons who had filed claims for land but had not received it that the supply of land was running out and that they would have to reconcile themselves to the fact that most of them would never receive it.

It may easily be granted that the breaking up of some types of large holdings would be highly desirable. The typical land reformer, however, is zealous for his reform and is likely to give little attention to any other considerations. In addition, he is typically impatient and feels that the land should be redistributed quickly over an entire country. Such sudden reorganization of farms has many defects and carries with it a threat of sharply reduced production.

In the two countries that have had a general redistribution of land in large holdings--Mexico and Bolivia--farm production fell very sharply following the redistribution. The previous level of production was not regained in the areas affected for a quarter of a century in Mexico and at least 10 years in Bolivia. For a number of years, the population of these two countries has been increasing at rates of 2 or 3 percent a year and the need for food has been rising accordingly. In each of these countries, however, the revolution in land was accompanied by other political developments, so that the effect of the land reform did not stand out by itself.

Most of the Latin American countries have recently adopted some land reform law or program, but by 1967, the only ones, other than Mexico and Bolivia, to actually start any sweeping reorganization of the type advocated by the more enthusiastic reformers, were Cuba and Chile.

One of the difficulties in broad land distribution is that land varies so much from region to region and even from field to field. Certainly, not all land is suitable for small holdings of 10 or 20 hectares, and much of it should be protected from overcropping. Hence, a general, countrywide land reform is likely to conflict with economic land use and good conservation practices.

In addition, the basic need in areas of overpopulation is not to keep people on farms but to get as many as possible off farms and into nonagricultural pursuits.

If the redundant farm population is not drained away, a typical farming community in Latin America will contain about a third more people in 10 years than at present. A program aimed at dividing farmlands among existing farmpeople would, therefore, afford only temporary relief. Of course, there may be acute cases where this is justified, but other and more lasting remedies should be instituted as quickly as possible.

Land reformers assume that large amounts of good land are idle in large holdings, but evidence on this point is inconclusive. There is indeed much land in large holdings that is not being used for intensive crops. But this does not indicate that it could or should be so used. Land that is too rough, too sandy, or too poor for crops should be kept in pasture or in forest as this is its most productive use. The fact that such land is more likely to be found in large than in small holdings lends color to the "idle land" hypothesis. Where land is fertile, reasonably smooth, and accessible to markets, it is unlikely that an owner would prefer to leave it idle.

On the other hand, on farms of all sizes, there is land that might well be used more productively. Certainly not all of this is to be found in large holdings.

The reason for nonuse or for very extensive use of land is often that such land is far removed both from markets and from highways. Much of this was purchased by urban investors from their government as a hedge against inflation. This land could, if recovered by the government, be returned to the public domain. Unfortunately, most governments do not have the funds required to buy it back.

It would be desirable to reorganize many large holdings and put them in the hands of small or medium-sized operators--provided that such operators were competent farmers. The absentee owner is seldom well informed on agricultural methods and the manager whom he puts in charge usually only carries out the orders of the owner. Absentee ownership is seldom highly productive, nor does it contribute to community life.

Local legislative bodies could develop laws and other regulations that would make landholdings unattractive under absentee ownership or other conditions not conducive to social welfare. In many cases, even a moderate land tax would make absentee ownership and inefficient use unprofitable and would at the same time improve the revenue position of the government.

As it is, even though improvement is being made here and there, land taxes in most parts of Latin America are very low. If the needed roads, schools, and other public facilities are to be provided, it will be necessary for every farmer, large or small, to contribute to the public revenue. In addition, it is certainly socially justifiable to penalize nonuse of land where clearly its nonuse is contrary to social interest. (But it must be noted that clear definitions in such cases are not easy to make.)

Not all large holdings are bad just because they are large. Many are efficiently managed by resident owners who are leaders in their communities. Also, there are some forms of agriculture where efficient operation requires a relatively large area per farm unit. Sugarcane production, cereal production, and cattle production on poor or rough land may be mentioned as examples.

One difficulty with the redistribution of land as a means of improving the condition of the small farmer is that the large holdings are not all in the same areas as the excess population. Furthermore, it is now realized that the large holdings are themselves often overstaffed, and in case of a redistribution, there would be no land left over on which to settle additional families.

Resultant Forms of Tenure

If redistribution is to be effected by means of tax incentives, the speed and extent to which large holdings are reduced will depend on the rates of taxation and on supporting legislation adopted at the same time. In this case, the reorganization into new farms

would be largely automatic since the former owners would be obliged to sell all or part of their land to new operators. Under these conditions, resulting farms are likely to be much like the medium-sized ones already existing.

If the land is to be expropriated and redistributed under government direction, there would seem to be three principal alternatives that could be followed in redistribution. (It should be pointed out, however, that there has been but little serious discussion of what might be done afterwards or of the possible forms of tenure and operation and of their various advantages and disadvantages.)

The first of the redistribution alternatives would be the establishment of more small farms, although farms too small for adequate return are the evil that the reform would set out to cure. However, political directors of a reform are under strong pressure to benefit as many persons as possible and this policy would result in many small farms rather than a smaller number of medium-sized ones.

The second alternative would be the establishment of a system of state-operated large farms. Whether they would be called state farms, cooperative farms, or some other name, the end product would be a new system of *latifundia* (extremely large estates) much like the system before the reform. The new units would be managed by state-appointed officials who would perform the same functions as the former managers but would report to an official bureau rather than to private owners.

This system has not yet been tried in the Americas except in Cuba. Where it has been tried, chiefly in eastern Europe, the results have not been especially productive. State-appointed managers would have less control over the persons living and working on the new *latifundia* than did the managers under the system of private property. Consequently, such a system would not be likely to lead to great productivity.

The third alternative of tenure following redistribution, would be a system of *ejidal* holdings as in Mexico. The *ejidal* system allots to each beneficiary the use but not the outright ownership of a small piece of land. The *ejidatarios* thus do not have title to their land and cannot sell it. Hence, they cannot convert it into cash with which they might purchase land elsewhere, nor can they use it as capital in some other occupation. In effect, they are frozen in their status as *ejidatarios*.

If land redistribution under government direction is unavoidable, the division among small freeholders would seem the least objectionable of the three alternatives just described, especially if the new landholders were given full ownership of the land after a specified period of occupancy.

Land redistribution is conceived of as a means of benefiting the *minifundista*. However, the redistribution would be of little benefit to him and none to the community if the reform did not actually increase his land but merely increased the number of *minifundistas*. The great evil of *minifundia* is that it leads to a great waste of human potential and thereby keeps hundreds of thousands of farm families at low levels of living.

The problems of present Latin American agriculture, particularly in connection with small landholdings, are too numerous and too complex to be solved simply by dividing large agricultural holdings into small ones. Before adopting sweeping reforms, it would be well worthwhile to plan carefully the systems of tenure and of farm operations that would be likely to result.

CAPITAL

One of the most serious difficulties of the Latin American farmer is the great shortage of farm capital and its high cost. This affects virtually every phase of farm operation. On a large proportion of farms it forces the use of methods involving high labor inputs and results in low outputs of crops or livestock per unit of land and labor. The problem is complex and varies from country to country as well as among farms of different sizes and types.

Capital Requirements

Requirements for capital are affected by several influences, some of them abstract. Some of the more important influences and their general nature are explained below.

For each farm and for each enterprise it could be expected that the principle of diminishing returns operates. Although additional capital might have some advantages, each increment on a given farm normally yields a smaller return than the preceding one. If, however, the technology is changed, entirely new rates of return may occur, not only on the capital but on the other factors of production as well.

For example, a shift from open-pollinated seed to hybrid seed corn, or from hand methods of cultivation to power methods may lead to a much greater volume of production without a proportionate increase in farm operating costs.

The relationships between the different farm enterprises are often quite complex. A change in methods that affects one enterprise may influence several others as well. An example may help to make this clear.

Suppose, for example, that a farmer has been raising 40 acres of corn, using open-pollinated seed and getting an average yield of 50 bushels. He decides to change to a hybrid strain which will increase the yield by 25 percent.

The capital requirement for seed corn now changes from 8 or 10 bushels of open-pollinated seed to an equal amount of hybrid, costing perhaps an additional \$50 and increasing total corn production by 500 bushels. But this is only the beginning of the readjustment. The increase in yield makes corn relatively more profitable compared with other crops than it was before. Therefore the farmer may well increase his acreage in corn and reduce the acreage planted in other crops.

With the increase in corn production, he will also need more storage space and may need an additional capital input for enlarging his corn cribs. To harvest and store the increased corn, he will also have to hire some extra labor.

Next comes the question of how to dispose of the increase. It might be sold for cash, which would involve the smallest possible change in farm structure. If, however, the farm is a diversified one, or is at least producing some livestock, the livestock enterprises are likely to be modified as well as the crop acreages. This may involve raising more hogs, fattening more beef cattle, or increasing the size of the dairy enterprise. New opportunities are thus opened up and these will lead to changes in farm structure to take advantage of them.

It is important to realize that there is no unique requirement for capital (nor for labor) in operating this farm. The requirements for capital (or for labor) on such a farm vary with income opportunities. Furthermore, these opportunities shift, both with the relative prices of products and with the farmer's knowledge of alternative methods of production.

The relationship between capital and returns on a farm is not purely a mechanistic one. At each stage of production, shifts in production are subject to decisions by the farmer. These are influenced by his education and his knowledge concerning (1) potential yields from different methods, (2) trends of prices of the various farm products that he might produce and (3) farm equipment and supplies.

The shortage of farm capital and the backwardness of technical knowledge of many Latin American farmers, especially small farmers, mean that many opportunities to increase farm output and farm income are ignored. The extent to which these opportunities can be realized in the future will depend on improvements in agricultural education, on the one hand, and on the supply and interest rate of farm capital on the other.

Under the conditions prevailing in Latin America, any estimates of the amounts of capital needed must be interpreted very carefully. Available figures on amounts of capital now used will be reviewed in the following pages for several countries.

The common classroom doctrine is that if the amount of one factor of production, say capital, is added to an established combination of the other factors (labor, land, and management) on a given farm, the total output may increase somewhat, but the increase will be less than the proportionate increase of the variable factor. This assumes that there is no change in proportions among the other factors and no change in the technology used. Unfortunately, in most discussions, but little attention is given to the influence of technology. Actually, where the methods are modified, the returns may not decline. This is not to say that the principle of diminishing returns has been suspended but that more effective methods may outweigh its effects.

Thus, in shifting from a hoe or from mechanical cultivation to the use of herbicides in controlling weeds, greater production may be obtained with negligible added expense, or the new method may actually be cheaper than the old one. Shifts from open-pollinated seed to hybrid seed, or from mechanical to chemical weed control are rather fundamental technological changes. Yields and economic returns may actually be increased by the change. The same type of change in production occurs with adoption of improved varieties of coffee trees or of rust-resistant wheat.

Changes of dates in planting or harvesting a crop may involve but little inconvenience or cost, but may increase the returns per unit of capital or labor applied.

A shift in the type of power used in crop production from hand methods to a one-horse outfit, or from one horse to two or four horses, or from four horses to a tractor, are all expected to involve some added capital inputs, but under favorable circumstances as to type of crop, topography of the land planted, size of the farm, and so on, the increased capital application may be associated with increased rather than diminished returns. This is particularly important since so much of Latin American agriculture is changing in technology.

According to the standard explanations, the curve of diminishing returns is shifted upwards and to the right when an improved method is applied. But it would be more accurate to say that, with the change in technology, optimum returns are now obtained by an entirely new combination of factors, some of which did not enter the combination before.

As expressed by Glenn Johnson, (42) the new combination of factors is as conventional as was the old one but it is a new convention with different axes and with different functions of input to output.

Variations in amounts of capital per farm, as between countries or regions, are thus associated with two distinctly different sets of influences. One is the standard, classroom variation in returns that occurs when proportions are shifted among the different production factors under an unchanging technology. The second is the result of a change in methods.

Size and topography of the farm unit influence the capital requirement per hectare. Some new methods may be applicable on small farms as well as on large ones, or on rough land as well as level. This is true of dates of planting or harvesting a crop and of varieties of crops planted. But the use of a large capacity machine may not be economical on a small farm, nor on a farm with very steep land.

Small farms require more capital per hectare than do large ones. Each farm needs a certain minimum investment for farmstead, corrals, fences, well and water system, and other items. But 10 farms of 10 hectares each require considerably more capital than one farm of 100 hectares. On purely economic grounds, therefore, it would be poor policy to allocate a great amount of capital to small farms if capital is particularly scarce.

There are, of course, considerations that overrule the purely economic ones. Compassionate, as distinguished from economic grounds often dominate. It would be desirable to admit frankly which consideration is being given priority in individual cases.

A further complication in the demand for farm capital is that the most advantageous investment per hectare differs with types of farming. A sugarcane plantation, a tobacco

farm, or a coffee plantation will require much more capital per hectare than would a wheat farm or a cattle ranch.

The type of farm depends, in turn, on climate, topography, type of soil, location with regard to markets, and other factors. If an attempt is to be made to compare value of capital or credit input of countries, this must not be lost sight of. Thus a larger capital input per hectare is justified in Colombia and Costa Rica, with their high proportion of coffee farms, than in Argentina, with its beef cattle and grain production. Argentina might be as well supplied with capital valued at \$20 per hectare as Colombia with capital worth \$50 per hectare, but with smaller farms and with a more intensive type of agriculture.

The farmer is concerned with three broad categories of capital, and, within each of these, with several specific applications of funds or capital goods. The general categories are public investments, investments in ancillary industries, and investments in the farm itself.

Public Investments

The largest public investment closely affecting agriculture is undoubtedly transportation, including highways and government-owned railroads. Other such investments are telephone and electric power services. In some countries, these, like the postal service, are owned and operated by the government. A third group of large public investments includes irrigation-drainage works. These are increasing in importance as population pressure calls for the use of additional land. Important investments for future development are the public school system, agricultural colleges or universities, experiment farms and the equipment that goes along with them, and hospitals and other health services. It scarcely needs to be pointed out that in most Latin American countries, the farm population receives much less benefit than does the urban population from these public services.

Ancillary Industries

In the second category of capital investments are factories for producing agricultural equipment, implements, tractors, fertilizers, insecticides, herbicides, and other supplies. Also included are processing plants such as cotton gins, coffee processing plants, butter or cheese factories, meat packing plants, storage facilities such as grain elevators or silos, cold storage plants, and market buildings. Usually, these are owned and operated by private interests, but sometimes they are government owned and operated.

When such plants are operated by private interests, their earnings are ordinarily under less control than are those of such public utilities as the railroads and telephone systems. Consequently, their operators have less difficulty in obtaining needed capital than do the utilities or the farmers.

Investments in the Farm Itself

Purchase of Land.--The largest investment that the farmer usually makes, unless he inherits his farm, is for land rather than capital goods. Land not only requires the greatest investment, it is also the slowest to liquidate because of the low rate of gross annual earnings as compared to purchase price. The young, would-be farmer must either rent land until he has accumulated funds to pay, or, if he has the money, he must locate a landowner who can sell him the type of land he wants.

The prevailing system of agricultural finance in Latin America provides no means of financing the purchase of land. There is a continuous stream of young men who want to become farmers, and also a large number of older farmers who wish to retire or to shift into other activities. It would be of value to individuals and to society if there were some way of bringing buyers and sellers together and assisting the transfer of landownership.

In the United States in recent years such transfers have been about 45 per 1,000 farms. Of these, 28 or 30 have been voluntary sales; two have represented foreclosures or tax sales; and the remaining 14 or 15 have included inheritance, executor's sales, or other types of transfers. The transfers have been made easier by the existence of a free and at least semiorganized market for land, together with reasonably easy financing facilities, which are lacking in Latin America.

The scarcity of credit for land purchases, as well as for other long-term use, is indicated by the low percentage of agricultural loans that are made for periods of more than 3 or 4 years, or indeed for more than 1 year.

Credit is easier to obtain in Central America than in most of the other Latin American regions. Even in Costa Rica, figures from the national banking system for 1964 showed that 74 percent of the loans for agricultural and livestock production were for short periods, usually under 1 year. Nineteen percent were for intermediate periods and only 7 percent were for longer terms (70).

In the early 1960's, in Mexico, where some 70 percent of the value of farm property was in land, 1 percent of the loans by the Banco Agrícola were for real estate purchase or improvement. Between 25 and 30 percent were for intermediate periods, usually of 5 or 6 years. There are, however, commercial facilities in Mexico that can finance some long-term loans.

In Chile, 16 percent of the 1962 loans of the agricultural department of the Banco del Estado were for improvements, not necessarily long-term ones. About 10 percent were for dairying and livestock production, and about 6 percent for government settlement projects. Some small loans were also made by the Bank's mortgage department.

In Colombia, only 1.3 percent of the loans by the Caja Agrario, Industrial y Minero in 1959 were for buying land. In fact, only 13 percent were long-term loans--that is, loans of over 5 years. Fifty percent were for 1 to 5 years, and 37 percent for less than 1 year. These loans of Caja Agrario, however, were not all for agriculture. Some were for industrial or mining purposes.

In other countries also, the percentage of credit available either to acquire land or for long-term improvements was very low.

Capital Goods.--The durable capital goods on a farm are comprised of buildings; fences; plantations of coffee or fruit trees; irrigation systems; drainage systems; and farm water systems, including wells, pumps, and tanks. Funds for purchase of these improvements, like those for land acquisition, must be provided on a long-term basis, either from accumulated earnings or from long-term loans. The farmer does have, however, some flexibility in obtaining this type of property. He can get along for some years with but few improvements and can add fences or improvements to buildings as opportunities occur.

Machinery and equipment have a shorter life. Tractors, farm implements, and automobiles and trucks used for farm purposes usually last 10 to 20 years. These can often be financed by the farm equipment dealers, at least for periods of 2 or 3 years.

Farm livestock may be divided into at least two groups. One group consists of breeding animals--beef cows, dairy cattle, and work horses--which have useful lives of 8 to 10 years and sheep or sows that are kept usually for 2 to 4 years. A second group consists of fattening animals--steers or hogs which are to be kept on the farm for 2 or 3 months up to a year. These have the financial advantage of being self-liquidating. In other words, when the fattening process is ended, income from the sale of the animals can be counted on to pay off their purchase price. Consequently, loans can be obtained more easily on such livestock than on any other type.

The circulating capital goods, which are consumed the first time they are used, include seeds, feeds, fertilizers, spray materials, fuel for tractors or trucks, and similar goods. Capital for these items and liquid funds for hiring labor and paying current expense in making a crop or operating the business within the farming year are the easiest to

obtain from Government credit systems and from banks. In Latin America, they represent the bulk of the agricultural loans.

The agricultural portfolios of the government finance agencies are ordinarily classified as to lists of crops and specific livestock enterprises, and give little attention to types of properties or requirements of the farm as a whole. Sums available are usually assigned to specific types of loans--so much for producing corn, so much for oilseeds, and so on. Crops whose production a government disapproves are omitted from the list of budgeted loans. The procedure undoubtedly has some influence in controlling production, although not as much as intended. It is relatively easy for a farmer to borrow funds, if available, for the approved crops and then use his own capital to produce others which he wants to grow for his own reasons.

The effort to control production through loan policies of government agencies is ineffective also because the percentage of farmers who receive government credit is very small in most countries.

Capital Sources

Capital for the farm is obtained from a combination of sources which vary in their importance from country to country. Six principal sources are:

1. The farmer himself and his unpaid family help.
2. Government credit agencies in the individual countries.
3. Various international agencies.
4. Commercial banks, insurance companies, and similar financial institutions.
5. Commercial firms, including suppliers of farm equipment, purchasers or exporters of farm products, general stores, and others.
6. Private individuals.

Information on the amounts of funds supplied by these various agencies is fragmentary or nonexistent in most Latin American countries, but each is of some importance.

A large part of the capital on farms represents savings or labor invested by the farmers themselves. This may come from funds saved out of annual net farm income, or it may represent work done by the farmer and his hired man during the slack periods in the yearly labor calendar. Considering the shortage of farm capital, this source is particularly important.

In a 1958 study of coffee farms in Sao Paulo by FAO, ECLA, the Brazilian Coffee Institute, and the Agricultural Secretariat of the State of Sao Paulo, it was found that farm-produced capital comprised about two-thirds of total farm capital aside from the land. In this coffee region, a large part of the investment consisted of the coffee trees which, of course, would be considered chiefly farm-produced capital because of the farm labor required to grow them. On livestock farms, the greater part of the capital consists of cattle or other livestock raised on the farm. Elsewhere, the farmer and his help produced capital in the form of fencing, drains, irrigation ditches, terraces, and simpler farm buildings.

Just how much of the short-term and intermediate-term capital on farms is financed by commercial firms is not known. In areas where government credit agencies are poorly supplied with funds and where commercial banks give but little credit to farmers, short-term capital probably represents the bulk of farm credit. This capital comes not only from ordinary stores but also from dealers in equipment, fertilizer, and other supplies. Banks are important in this connection in that they commonly discount considerable commercial paper for the dealers in farm supplies. Exporters and processors of farm products frequently give technical guidance as well as advances of funds for farm operation.

Some credit comes also from private individuals, storekeepers, relatives, or friends of the farmers.

In most countries, a limited supply of short-term credit comes from banks. This is important for the larger farmers who are known to the bankers. Commercial banks seldom extend much credit to small farmers because small loans are more expensive to administer per \$1,000 loaned than are large loans, risks are higher in loaning to small farmers, and small farmers are usually not personally known by the bankers. There are a number of factors that are not statistically comparable among countries. These include the type of land, types of farming followed, and the varying technical knowledge of the farmers, all of which affect their earning ability and credit requirements. In addition, commercial and industrial sectors compete for the available credit supply. Finally, there is the question of the rate of inflation in progress which may almost destroy the incentive to save.

A simple index of availability of farm credit is found in the amount loaned or available per farm. This is, however, not a very satisfactory indicator because of the differences in sizes and types of farms. A second possible index is the amount of borrowed credit applied per hectare of farmland. This also, is not satisfactory because of the variation in natural and economic characteristics of land and in the proportions of woodland, pasture, and other less productive areas. A third possibility is the amount of borrowed credit per hectare in cropland. This is somewhat better, but it fails to include pasture, and pasture is the best use that can be made of much land in the newer sections of Latin America.

Comparisons with amounts of farm credit extended in the United States or Europe would be misleading.⁸ In general, the land in the United States and Europe is utilized more intensively and with much more capital per hectare than land in Latin America. This is not always true, however. There are also areas in Latin America where land is very intensively utilized with high inputs of both capital and labor. Examples are the areas used for sugarcane, coffee, citrus or other fruit, and vegetables.

Funds made available through government agencies are very limited. The governments seldom have sufficient funds to conduct properly their normal functions--such as police work, education, sanitation, and postal services--without having to provide funds out of the public treasury to finance large sectors of their economies.

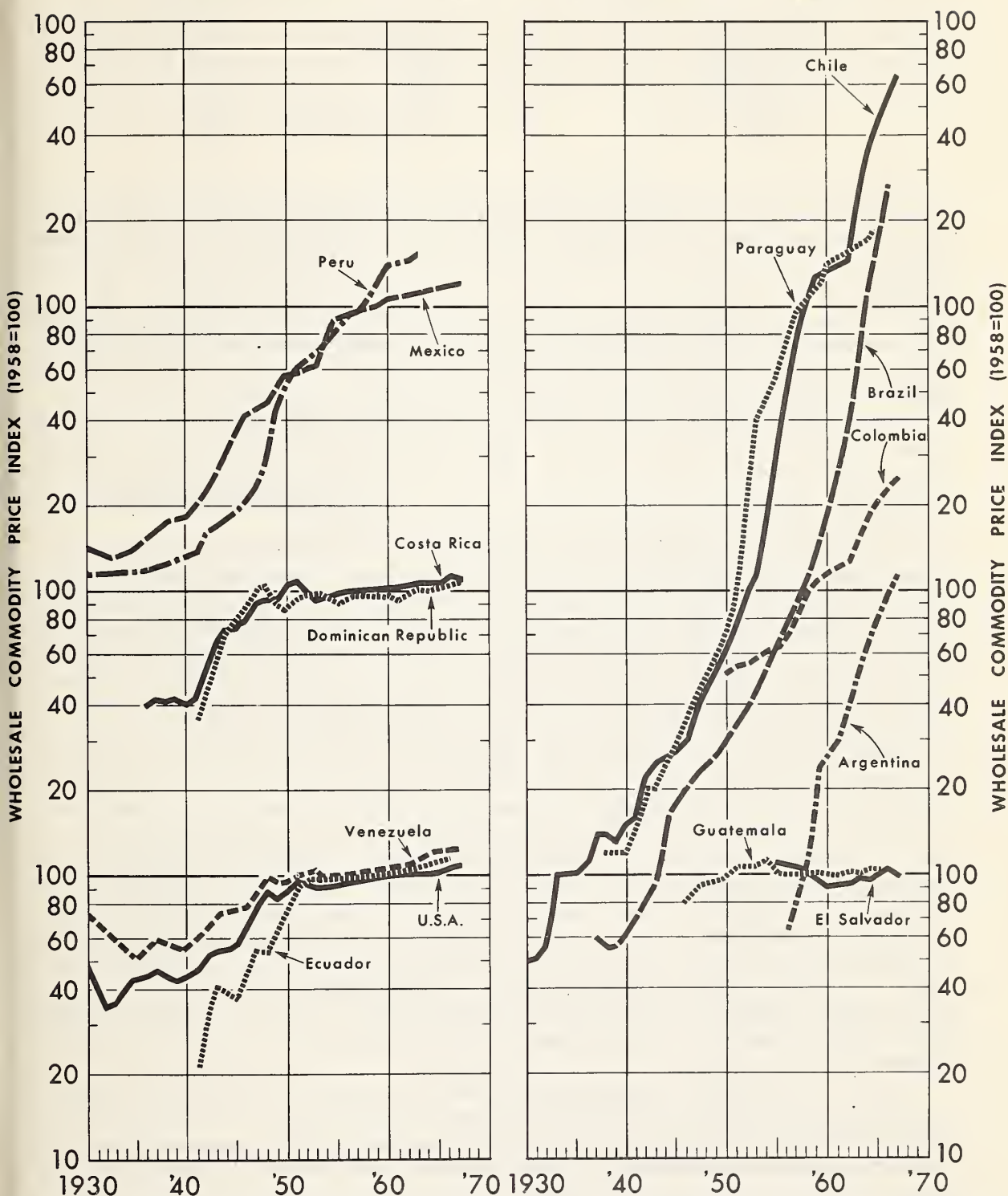
Information on commercial credit for farmers is usually very incomplete. The farm capital supply is limited by the same influences that limit the capital supply for other purposes--the degree of development of the economy, the general condition of the economy at any given time, size of the national product, incentive to save, and the competing capital demands from other sectors.

Inflationary Problems

Except in Central America, Ecuador, and Venezuela, anything like a normal supply of credit for agriculture or other sectors has been virtually destroyed by persistent inflation. The rates of increase in wholesale commodity prices for the United States and 13 Latin American countries from 1930 to 1965 are shown, where data are available, in figure 4 and appendix table 10. As indicated, inflation in most of these countries is not a temporary disturbance but rather a persistent tendency which has already lasted for many years.

⁸ There were 3,704,000 farms in the United States on December 31, 1959. These had mortgage debts of \$11,091 million, plus non-real estate debts of \$10,085 million according to the U.S. Farm Credit Administration. There were approximately 400 million acres (162 million hectares) of cropland. The combined agricultural debt of \$21,176 million thus amounted to \$5,700 a farm or \$131 per hectare of cropland. Of the latter figure, about \$68.50 per hectare was for mortgage debt and \$62.25 for non-real estate debt. Farm debt in the United States, however, was increasing rapidly, and by December 1965 had risen to \$40,146 million or nearly \$250 per hectare of cropland.

WHOLESALE COMMODITY PRICE TRENDS IN LATIN AMERICA AND THE UNITED STATES



U.S. DEPARTMENT OF AGRICULTURE NEG. ERS 5838-69 (1) ECONOMIC RESEARCH SERVICE

Figure 4

Averages of the annual percentage increase (or decrease) in prices for these countries and the United States for the years 1950-65 (or for years available) were as follows:

El Salvador (1955-65)	-1,3	Mexico	4,9
Costa Rica	-0,1	Peru (1950-63)	9,5
Guatemala	-0,1	Colombia	9,8
United States	1,1	Brazil	33,8
Venezuela	1,8	Chile	34,4
Dominican Republic	2,3	Paraguay (1950-61)	35,2
Ecuador	2,7	Argentina (1956-65)	35,8

Inflation has been defended by many persons in Latin America on the grounds that it is necessary to permit expansion of the currency base needed for economic development. If this were true, however, it might be asked how one could explain the rapid economic development in the northern countries of Latin America where there has been but little inflation.

The continuing rapid increases in public expenditures coupled with failure to impose adequate taxes and to collect a large part of the taxes levied have led to persistent deficits in public revenue (72). A lack of sufficiently strong fiscal control measures and widespread evasion of taxes have aggravated the tendency to deficits.

Where rapid inflation is in progress, persons who have accumulated capital are seldom willing to loan it out to others, especially for long periods. It is better business policy to keep such funds in their own hands or to purchase tangible property to avoid shrinkage in buying power. When loans are made, the lender will demand a gross rate of return sufficient to insure against the expected rate of inflation.

Governments are often free in promising each year to take measures that will prevent further inflation. Potential lenders take but little assurance from such promises. Thus, gross interest rates in Central America where there is but little inflation have been around 8 or 10 percent a year. But in the four southern countries with rapid inflation, very little credit for farmers is obtainable at any rate, and where commercial loans can be had they usually cost from 2 to 3-1/2 percent a month. In addition, such loans can often be obtained only for purchases such as farm equipment on which the price to the purchaser has previously been marked up to give further insurance against inflation.

Each government, however, has some sort of national farm loan agency which advances small sums to farmers at what appear to be more normal rates.

Latin American governments have depended largely on export taxes, import taxes, sales taxes, and almost any means of collecting revenue except income or property taxes. Use of the latter two forms of taxation is, however, increasing in some countries. In general, the taxation systems have been regressive and governments have shown persistent deficits, often very large. There are many reasons for this situation. Influence on governments by persons with large incomes has been great. Latin Americans are as opposed to paying taxes as are the people of any other region--even though tax rates are low. Governments have usually been acquiescent in granting demands for services and various types of social reforms. These include education, housing, military services, improved health services, and so on. All of these have helped to increase the deficits and the rate of inflation.

Dudley Seers shows that deficits in tax revenue as compared to public expenditures for 1947-57 averaged about 40 percent in Argentina and Chile and 18 percent in Brazil and Mexico (86). In El Salvador, the corresponding average deficit was only a little over 6 percent, a much more manageable figure. Venezuela, with its large revenue from petroleum, in 1957 and 1958 paid off indebtedness contracted in earlier years. Later, however, it accumulated new debts, especially to international financing agencies.

The scarcity of loanable funds has been aggravated by a flight of capital caused by inflation and also by political uncertainty in some countries. Raul Prebisch estimated that

private deposits from Latin America in the United States on June 30, 1947, amounted to \$729 million (83, 89). They have probably not declined since. There are also other destinations for exports of funds in addition to the United States. There are so many possible methods of transferring funds from country to country, legal or illegal, that it would seem almost impossible to make an accurate estimate of the full magnitude of the capital flight.

Inflation, of course, affects the entire economy. Its effects may be virtually paralyzing to the small- or medium-scale farmer who must have some additional capital to expand his production and improve his income position.

Selected Farm Credit Sources

Among the influences on supply of farm credit, three are of special importance--inflation, the general condition of the capital market in each country, and the extent to which the government tries to direct credit toward agriculture.

The countries to be reviewed in this section can be divided into three groups on the basis of their rates of inflation. The first group consists of Venezuela and the Central American countries where currencies have been stable since 1950. The second consists of Mexico, Colombia, and Peru where inflation may be classified as moderate, with price increases of 5 to 10 percent each year. The third consists of Argentina, Brazil, Chile, and Bolivia where inflation has been rapid to violent, with annual price increases of 30 to 40 percent and sometimes considerably more.

Countries with Stable Currency

Venezuela.--The 320,000 farms enumerated in 1961 received credits of the equivalent of \$40 million from Banco Agricola y Pecuario (the Agricultural Credit Bank, or BAP) (39-41, 69). BAP reported 66,187 loans smaller than 5,000 bolivares (\$1,100), totaling \$15.9 million equivalent, and 3,825 loans of over 5,000 bolivares, amounting to \$12.6 million. Special funds of \$11.8 million were also loaned to farmers, mostly for livestock production. It is not known how many farmers received more than one loan. The Economic and Financial Department of BAP estimated that about 40,000 individual families received loans of the smaller class during 1961. Adding the 3,825 larger loans, it is apparent that about 14 percent of all farmers received government loans. The amount of private loans is not known.

The average of the reported loans, when expressed per farm for the entire 320,000 farms, would be \$155, or roughly \$20 per hectare of cropland, including fallow land and land in permanent crops.

Costa Rica.--In Central America, Costa Rica with its stable currency, high rate of literacy, and moderate diversification of agriculture has been relatively favored in its supply of farm credit (70, 55).

The largest source of farm credit in Costa Rica is the national banking system. This consists of four banks, all nationalized and operated under government direction through 104 branches scattered over the country. Loans are made to farmers directly or through rural credit unions, to cooperatives, and to coffee growers through coffee processing plants. The national banking system reported that the total of loans outstanding to agriculture on December 31, 1964, was 606 million colones (\$91.2 million).

The census of 1963 enumerated 64,612 farms with 610,000 hectares of cropland, including permanent crops and fallow land. Dividing total loans by total number of farms, an index of \$1,410 is obtained per farm, or \$149.50 per hectare of cropland (\$60.50 an acre). This is a substantial amount of credit, either per farm or per hectare. It should be remembered that some 200,000 hectares were in permanent crops. Most of this land was planted in coffee, but there was also appreciable acreage of cacao and bananas. All of these are intensive crops in which a relatively heavy capital investment is justified.

A study of Costa Rica made by CIDA concludes that credit to agriculture in that country has recently been adequate, although improvement might be desired in its distribution (72). Most of the data given below on this country come from the CIDA study.

Of all the loans made by the Costa Rica banking system, 50 percent were for crop production, 10 percent for livestock, and 40 percent for nonagricultural purposes. As in other Latin American countries, the Costa Rican system provides much more credit for short-term than for long-term use. Percentages of value of loans outstanding in 1963 and 1964 were as follows:

	<u>1963</u>	<u>1964</u>
Short-term (up to 1 year)-----	80.3	73.7
Intermediate (1 to 10 years)-----	13.0	19.1
Long-term (10 years or over)-----	<u>6.7</u>	<u>7.2</u>
	100.0	100.0

A stratified sample of 320 farmers was interviewed concerning use of credit and sources of loans. These farmers obtained 209 loans. Seventy percent of the loans (80 percent by value) came from the banking system; 14 percent of the loans (5 percent by value) came from dealers in agricultural supplies; and the rest of the loans (15 percent by value) came from other sources.

Nine dealers in agricultural supplies such as fertilizers, pesticides, fuel, and small equipment were asked where they got the funds to finance their sales to farmers. These, with the equivalent of \$2.2 million in loans outstanding, replied that 68 percent was from their own resources, 15 percent from other private sources, and 17 percent from banks.

In other countries where the banking system offers less credit to farmers, the proportions between dealer credit, bank, and government credit would probably be different.

In the CIDA study, it was found that funds were borrowed by 47 percent of the 211 small-scale farmers interviewed, by 76 percent of the 66 medium-scale farmers, and by 75 percent of the 43 large-scale farmers. Reasons why other farmers did not borrow are of interest. The percentages of total numbers of answers given are as follows:

<u>Nonborrowers</u>	<u>Percent</u>
Had funds of their own-----	37
Opposed to contracting debts -----	30
Did not know about sources -----	12
Had insufficient security -----	13
Gave other reasons-----	8

Guatemala.--Farm credit presents a more difficult problem in Guatemala, with that country's predominance of very small farms, rough land, and a high rate of illiteracy. There is, however, a relatively free credit system, and an effort is made to provide as much credit as possible.

Credit is obtainable for the production year for cotton and a few other crops, especially export crops. It is harder to get credit for livestock and other products. No source is available for long-term mortgage credit.

The Banco de Guatemala acts as coordinator for the government. In addition to private banks and commercial firms, farm credit is furnished by the Banco de Credito Hipotecario (mortgage credit), Banco del Agro, Instituto de Fomento de la Produccion (production development), and Servicio Cooperativo Inter-americano de Credito Supervisado (supervised credit or SCICAS).

In crop year 1957-58, the Banco Nacional Agrario granted 7,563 supervised credit loans which averaged about \$500 each. Because of the small size of the average loan,

inexperience with this type of credit, and the large amount of service given with such loans, the cost of administration was about 40 percent a year on the capital sum. Later, this program was taken over by SCICAS, and larger loans of about \$1,100 each were granted. With more experience and larger loans, administrative costs were reduced to about 17 percent on capital sums.

Private banks have been an important source of credit for the larger farmers. In 1962, it was reported that the following loans were made to Guatemalan farmers (55):

	Number of loans	Millions of quetzales
State banks -----	4,617	9.2
Private banks -----	<u>1,236</u>	<u>24.1</u>
Total -----	5,853	33.1

Loans granted to agriculture during 1962, 1963, and 1964 by the Banco de Guatemala were as follows in thousands of quetzales (one quetzal equals one dollar):

	1962	1963	1964
For crop production -----	35,444	39,446	41,515
For livestock -----	<u>5,770</u>	<u>5,554</u>	<u>8,501</u>
Total -----	41,214	45,000	50,016

It is estimated that in 1962 Guatemala had about 360,000 farms with 1,830,000 hectares in cropland, roughly 5 hectares a farm. The small number of loans reported shows that a very limited percentage of farmers obtained credit.

A well-informed agricultural authority expressed the opinion that the typical small colonist in the newly settled lands in Guatemala could increase his production by 50 percent, or, in some cases, even by 100 percent if he had an added \$1,000 in capital or capital goods.

El Salvador.--Farm credit is provided through four agencies--The Banco Hipotecario de El Salvador (mortgage bank), Federacion de Cajas de Credito (credit unions), Compania Salvadorena del Cafe (coffee company), and Administracion del Bienestar Campesino (Farmers Welfare Administration). Loans may also be obtained from private banks and from the Cooperativa Algodonera Salvadorena Ltda. (a cotton cooperative).

Total loans to agriculture for 1960-64 were between \$40 and \$50 million on the basis of incomplete reports from the agencies concerned (39, 40).

The census of 1961 enumerated 224,000 farms, and these had 648,000 hectares of cropland. The value of loans made a year would come to about \$225 per farm or \$77 per hectare of cropland.

Nicaragua.--The Banco Nacional de Nicaragua is the principal source of credit in that country. Most of its farm loans are for short-term crop production. Livestock has been increasing in recent years, however, and intermediate-term livestock loans amounted to the equivalent of \$5.2 million on December 31, 1964. In the crop year 1962-63, the Bank also advanced \$794,000 to small farmers who would have had difficulty in obtaining commercial credit (52).

At the end of 1964, private banks had outstanding loans to commercial farmers of nearly \$45 million. About 70 percent was for cotton production and 20 percent for coffee.

Nicaraguan farm credit outstanding in 1964 was approximately \$640 a farm or \$45 per hectare of cropland, counting all farms in the country.

Honduras.--Honduras, with poorer land and slower development than the other Central American countries, has been the least-favored in its supply of farm credit. The Banco Nacional de Fomento is the principal agency providing agricultural credit. In 1962, such

credit was estimated to be as follows in million dollar equivalents: For coffee production, 5.6; for rice, 5.2; for other crops, 3.3; and for livestock, 4.7.

These short-term loans amounted to about \$100 a farm or \$16 per hectare in cropland for the country as a whole.

Countries with Moderate Inflation

These countries include Mexico, Colombia, and Peru. In Mexico, the average annual increase in wholesale prices from 1950 to 1965 was 4.9 percent; in Peru, it was 9.5; and in Colombia, 9.8 percent. At these rates, the incentive to save and the supply of credit were affected by uncertainty concerning prospective purchasing power of loan funds when time for repayment arrived, but not so seriously as in the countries farther south.

Mexico.--Analysis is complicated by the existence of two distinct types of tenure which exist side by side and are served by two distinct credit systems.

In 1960, Mexico had 1,346 private farmers, plus 1,598,000 ejidatarios. Of the latter, 1,524,000 held land. Credit to the combined groups in 1963, according to Banco de Mexico, amounted to the equivalent of \$659 million (47, 48, 67). Of this, \$186 million came from banks or various types of finance companies; this amount was nearly all loaned to private farmers. The rest was from government sources and most of it went to ejidatarios. By 1965, according to the Banco de Mexico report, total loans to farmers had increased to \$853 million.

There are two principal government channels for credit to farmers: The Banco Ejidal which finances ejidatarios, and the Banco Agricola which makes loans to private farmers. The Banco Nacional de Comercio Exterior also extends some agricultural credit, largely to facilitate exports or production for export. Commercial banks are required to keep 5 percent of their funds on deposit with Banco de Mexico. These are utilized to rediscount commercial paper, chiefly in Mexico City.

The Banco Ejidal makes its loans through credit societies of which there may be more than one in an ejido. In 1960, there were about 9,000 of these ejidal credit societies with 371,000 members. Approximately 200,000 of them, or about 14 percent of all ejidatarios, received loans. The average loan was about \$260. For all ejidatarios holding land, the average would be around \$65, or \$10.50 per hectare of cropland.

The ejidatarios are very small-scale farmers with limited income. The Banco Ejidal performs a number of services not ordinarily associated with credit operations, and some of its loans are really for relief more than for production. Consequently, its operating expenses are high and collections are likely to lag behind maturities. The Government has found it necessary to make frequent appropriations to replenish the Bank's funds. Operating expenses during the 1950's ran from 6 to 12 percent of the amount loaned, the collections of matured loans varied from 56 to 90 percent.

The Banco Nacional de Credito Agricola, operating on a smaller scale than Banco Ejidal, makes loans to private farmers. Its total loans to farmers in 1963 amounted to \$73 million. About two-thirds of this was for short-term production purposes. Intermediate loans included small amounts for equipment, livestock, irrigation, pasture improvement, and various other purposes. In addition, the Bank has advanced funds for various purposes indirectly related to farming at the behest of the Secretary of Agriculture. For example, its portfolio for December 31, 1963, contained an item equal to \$96 million entitled "various obligations," the largest element of which was apparently used to establish a system of livestock centers under the Secretariat of Agriculture.

The Bank reported that 31,200 persons received loans from it in 1963. At this rate, its average loan would be something over \$2,000. Adding its credits of \$73 million to the \$186 million from private banks, and making some allowance for increase in number of farmers since the 1960 census, the average credit extended directly to private farmers in 1963 amounted to around \$185 a farm or \$18.20 per hectare of cropland.

Most of the government credit available to farmers in Mexico is directed into production of specific crops. These crops include cotton, corn, wheat, henequen (a fiber), and rice. As in most Latin American countries, the Government uses its credit facilities primarily to advance its economic policies and only incidentally for the benefit of the farmers. Primary consideration is given to advancement of the economy as a whole, whether it be industrialization, increased exports, or national self-sufficiency. The farming population does not ordinarily rank very high in order of priority.

Colombia.--The Caja de Credito Agrario, Industrial y Minero (Fund for Agricultural, Industrial, and Mining Credit) has been the principal channel for government credit to farmers in Colombia for more than 30 years. In 1965, it reported that it had 601 offices scattered over the entire country (14). In addition to extending credit, it also sells fertilizers, equipment, pesticides, and other supplies to farmers. Such sales in 1965 came to \$18 million.

Additional credit is furnished to farmers by the Banco Ganadero (mostly for livestock), Fondos Ganaderos (for livestock), Banco Cafetero (for coffee), Instituto de Fomento Algodonero (for cotton), and to various cooperatives. The cooperatives may obtain funds from the Caja. Some credit is also available from commercial banks. Banks are required to make available 15 percent of their funds for agricultural loans. Part of this 15 percent is loaned through a recently organized Fondo Financiero which loans funds from the Banco de la Republica through the Caja and commercial banks.

The Caja, like most government agencies in Latin America, has essentially a monocultural approach to farm credit. Its portfolio and summary of loans are drawn up in the form of a long list of specific crop or livestock enterprises for which the credit is supposed to be used. Principal items in the Caja's portfolio for June 30, 1965, in percentages of its total agricultural loans were:

	<u>Number of loans</u>	<u>Value of loans</u>
	<u>Percent</u>	<u>Percent</u>
Purchase of animals -----	38.0	42.1
Production of coffee -----	14.6	7.6
Purchase of machinery and equipment -----	1.9	7.3
Purchase of land -----	2.4	5.8
Production of rice -----	5.8	4.7
Pasture improvement -----	4.3	4.5
Production of corn -----	5.7	2.9
Production of sugarcane -----	4.6	2.8
Production of potatoes -----	3.5	2.4
Production of wheat -----	<u>2.9</u>	<u>2.0</u>
Total 10 items -----	83.7	82.1

These 10 items accounted for 83.7 percent of the number of loans and 82.1 percent of their value. The remainder of the loans were distributed among 16 other crops or groups of crops and a considerable number of other farm needs.

The general policy of the Caja, which does not differ greatly from that of other agricultural credit agencies in Latin America, is summarized in its Informe de Gerencia for 1965 which states that an effort is made to prevent use of agricultural funds for non-agricultural purposes. As far as it is able, the Caja gives the following priorities:

1. To crops which furnish raw materials for national industry or provide basic foods.
2. To intensive forms of livestock production.
3. To borrowers of high technical and managerial qualifications.
4. To those who do not have access to other sources of credit.

5. To clients with capital of not over 4 million pesos for loans for machinery (approximately \$250,000 at the 1966 rate of exchange).
6. To borrowers with less than 1 million pesos, loans of 70,000 pesos (\$5,500) per borrower for livestock.
7. To the Instituto Colombiana de la Reforma Agraria (INCORA) to implement the policies of that agency.
8. To a program of directed credit (13.5 million pesos or \$1 million) to stimulate production of desired crops and livestock.
9. To the support of a program of supervised credit. This program led to 7,481 loans totaling 87 million pesos (\$6.8 million) as of September 30, 1965.

For the year ending June 30, 1965, the Caja made new loans of approximately \$100 million. Sixty percent of this amount was for crop production, directly or indirectly. The following loans for agricultural purposes were outstanding on June 30:

	Number of loans	Value (Mil. dol.)
For specific crops -----	156,466	39.6
Other crop purposes -----	20,805	19.6
Specific livestock -----	123,720	52.4
Other livestock purposes -----	23,817	12.9
Total -----	324,808	124.5

The Banco Ganadero makes loans, chiefly, but not entirely, for livestock. For 1964, it reported new loans equal to about \$7.5 million and credit outstanding of about \$14 million. Other loans are made by commercial banks, mortgage banks, and development banks. These were estimated for the year 1963 as \$118 million, and farm credit outstanding at the end of year was estimated as \$105 million. Amounts from commercial firms and private individuals are not known.

Combining new loans from Caja Agrario with loans from other sources, new credit issued in the last few years seems to have amounted to about \$225 million each year. Total outstanding credit has been around \$280 million.

Colombia is one of the Latin American countries with a better than average agricultural credit policy, although credit conditions have been weakened in recent years by increasing inflation. Total outstanding credit amounted to the equivalent of about \$210 a farm in 1964, or \$55 per hectare of cropland (\$22 per acre), including land for permanent crops and fallow land.

The Caja held about half the total value of outstanding farm loans. The number of its loans was equal to about one-tenth the total number of Colombian farmers. Since loans go mostly to owners of medium- or large-sized farms, the proportion of total production affected by credit from the Caja was undoubtedly well above one-tenth.

Peru.--The Banco de Fomento Agropecuario (Agricultural Development Bank, or BFA) is the principal source of government credit for farmers. On September 30, 1964, this bank had outstanding about \$60 million of agricultural loans. Three-fourths of this amount was to medium- and large-scale farmers, although there is no clear definition of the dividing line between size groups. Most of the loans were short-term, and most of them went to farmers in the coastal region.

In crop year 1963-64, the bank made 26,245 loans at \$58.7 million. With 850,000 farm units enumerated in 1961 and with 2.2 million hectares of cropland, it is apparent that the credit from BFA does not reach a very large proportion of the farmers of Peru. At this rate, BFA loans amounted to about \$69 a farm unit or \$26.50 per hectare of cropland for all farms of Peru.

The Bank, however, makes advances to the Government for price stabilization and for other purposes, including agrarian reform.

An unknown amount of other credit for large- and medium-sized farms is obtained from commercial banks and from commercial firms.

Countries With Rapid Inflation

In Brazil, Argentina, and Chile, prices rose approximately 35 percent each year from 1950 to 1965. The supply of loan funds from private sources, consequently, contracted very sharply, limiting the availability of farm credit and resulting in greater demands from farmers for credit from the government.

Brazil.--The principal government source of farm credit in Brazil is the Agricultural and Industrial Section of the Bank of Brazil (CREAI or Carteira de Credito Agricola e Industrial). Agricultural loans are also made by the leading state banks, especially those of Sao Paulo, Minas Gerais, and Guanabara, as well as by the National Cooperative Bank. Various government institutes and commissions have some funds for agricultural loans. Among them are the Banco do Nordeste do Brazil, the Banco de Credito do Amazonas, the Instituto Brasileiro do Cafe, the Instituto Baido de Fumo (tobacco), the Comissao Executiva de Recuperacao da Lavoura Canaveira (sugarcane), the Comissao de Financiamento da Producao, the Comissao do Vale de Sao Francisco, and various others.

According to the 1965 Report of the Bank of Brazil, the amounts of credit outstanding for agriculture at the end of December 1965 were as follows (5):

<u>Bank</u>	<u>Million dollars</u>
Bank of Brazil:	
Crop production -----	264
Livestock production -----	<u>64</u>
Total-----	328
Other banks:	
Crop production -----	233
Livestock production -----	<u>67</u>
Total-----	<u>300</u>
Total-----	628

Eighty-one percent of the outstanding farm credit from the Bank of Brazil and 78 percent of that from the other banks were for crop production or other activities connected with crops.

The total of \$628 million from government and private banks amounts to about \$180 a farm unit or \$29 per hectare in cropland (\$11.70 an acre) for the country as a whole.

The government has been making an effort to stimulate agricultural production by expanding farm credit. CREAI reported the following new loans granted during the year 1965 (11):

<u>Type of loan</u>	<u>Number of loans</u>	<u>Million dollars</u>
Short term:		
Crop production -----	299,841	169.1
Livestock production -----	<u>11,790</u>	<u>5.6</u>
Total-----	311,631	174.7
Intermediate- and long-term:		
Improvement and preparation for crops -----	27,275	13.5
Livestock improvements---	16,686	11.7
Purchase of equipment and vehicles -----	31,856	38.6
Purchase of animals -----	9,511	6.4
Miscellaneous-----	<u>13,460</u>	<u>2.5</u>
Total-----	<u>93,788</u>	<u>72.7</u>
Total-----	410,419	247.4

The total number of loans reported was about one-eighth as great as the estimated number of farm units. Since some farmers obtained loans for more than one purpose, the actual number of farmers benefited was undoubtedly smaller than this. The average amount of new loans per borrower was roughly equal to \$60.

In its 1965 report, ABCAR said that it was operating 67 regional and 514 local offices in 767 municipios (counties) out of a total of nearly 3,000 municipios in the country. Its loans are extended at concessionary interest rates, chiefly in order to strengthen its extension work. In the same report, the number of loans was given as 12,318 and averaged around \$300 each (4).

Argentina.--Farm loans are made by the Banco de la Nacion Argentina and provincial banks. In addition, some farm credit is obtained from private banks, commercial firms, and private individuals, although it is not known how much the commercial and private loans amount to. About half the credit comes from Banco de la Nacion (3, 63). Its loans during 1963 and balances at the end of the year, compared with balances of the entire banking system, were as follows:

Item	Banco de la Nacion		Entire banking system
	Loans during year	Balance Dec. 31	
	<u>Million dollars</u>		
Crops-----	106	91	144
Livestock -----	29	35	108
Forestry-----	1	1	7
Crops and livestock ---	49	65	100
Total-----	185	192	359

The greater part of the credit for crop farms was for current operating expenses; for livestock farms, it was for purchases of animals. For diversified farms, the largest amounts were for tractors and implements. There is very little credit for purchase of land.

Total bank credit for agriculture in December 1963 amounted to \$780 a farm unit or \$18.40 per hectare of cropland (\$7.40 per acre).

Chile.--Sources of farm credit include four government agencies, private banks, and an unknown amount of credit from commercial firms and private individuals. The government agencies are Banco del Estado (Agricultural and Banking Departments), Corporacion de la Fomento de la Produccion (Production Development Corporation or CORFO), Caja de Colonizacion Agropecuario, and Instituto de Desarrollo Agropecuario (INDAP). The Banco del Estado issues loans to agriculture through its Departamento Agricola, through its Departamento Bancario, and through private banks (21). At the end of 1963, the Bank reported the following amounts of agricultural credit outstanding:

<u>Credit source and need</u>	<u>Operations</u>	<u>Amount of credit</u>
	<u>Number</u>	<u>Million dollars</u>
Agricultural Department:		
For crop production-----	21,347	5.2
For livestock production-----	7,192	2.2
Fertilizers, pesticides, etc. ----	37,486	14.3
Improvements-----	19,347	4.5
Miscellaneous-----	12,285	8.6
Total-----	97,657	34.8
Banking Department -----	-	20.9
Total-----	-	55.7

Based on the approximate number of farms and on the area in cropland in 1963, the credit reported above would amount to about \$300 a farm or \$21 per hectare of cropland (\$8.50 per acre).

CORFO reported a credit program of about \$6 million for 1962. Of this, about two-thirds was for livestock development. The rest was for drainage, irrigation, and other purposes.

Loans for medium-sized and larger farms come mostly from commercial banks. Under Chile's rapid inflation, there is virtually no credit to purchase land.

Intercountry Comparisons

Information on farm credit issued during specified years or outstanding at the ends of these years is brought together in appendix table 11. In most cases, these data refer to credits in the portfolios of banks or government agencies at the end of the year indicated, but in four cases they refer to credit granted during the year. Credit granted during the year is usually less than the credit outstanding. Amounts of reported intermediate- or long-term credit are very small, especially where inflation is rapid. Nevertheless, a large number of loans are renewed until they assume an intermediate- or long-term character.

The data are far from uniform in coverage. In eight of the countries shown, reports or estimates are included both for government agencies and for commercial banks. In four cases, only the government agencies are covered. In Costa Rica, the national banking system includes all banks and so can be compared with countries where there are estimates for commercial banks. In Mexico, the only credit reported for ejidatarios is that from Banco Ejidal which is virtually the only source of credit for this group of farmers.

Figures for the United States are given for comparison. U.S. figures include not only estimates for government agencies and commercial banks but also for "individuals, dealers, and others."

Since there are only negligible amounts of mortgage credit in Latin America, farm credit figures for most countries in that region should be compared with the U.S. figures for non-real estate debt only.

Only the larger farms in Latin America receive any appreciable amount of credit from commercial banks. Most of the farms or so-called farms are too small to be included in this category. On the other hand, this is the group to which government agencies pay most attention.

Value of credit per hectare of cropland (although not a perfect index) provides a more dependable figure for comparison than does credit per farm. It should be interpreted, however, as reflecting only the non-real estate debt. The credit per hectare as a rule runs considerably lower in countries that have had a high rate of inflation.

Only for Costa Rica does the value of credit per hectare approach that in the United States. In this case, about one-fifth of the debt is intermediate- or long-term, although not necessarily mortgage credit. Credit per hectare is also well above the general average for Latin America in El Salvador and Nicaragua, which, like Costa Rica, are also in the low-inflation group. The fact that other influences as well as inflation also affect the volume of farm credit is brought out by the variation within the same region. Honduras, for example, is in the low-inflation group, but is one of the countries with lowest credit per hectare of farmland. The reason is found in the relatively low agricultural and general economic development of that country.

International Agency Loans

The flight of capital from Latin America seems to be more than offset by loans from international agencies. The three principal ones concerned are: (1) AID, (2) the International Bank for Reconstruction and Development (IBRD) and its affiliates, the International Development Association (IDA), and the International Finance Corporation (IFC); and (3) the Inter-American Development Bank (IDB). The latter, in addition to administering its own capital, administers a fund for special operations and a Social Progress Trust Fund.

The greater part of these funds and all of the funds of AID have been contributed by the U.S. Government. In addition, the U.S. Government has subscribed \$6.3 billion of the \$22.4 billion of capital of the IBRD, \$320 million of the \$999 million capital of the IDA, and \$35 million of the \$99 million capital of the IFC. IBRD, however, operates on a world-wide basis and not merely in Latin America.

The IDB is entirely an Organization of American States (OAS) development. The United States has contributed \$150 million of IDB's \$382 million of paid-in capital. It has committed \$525 million to the Social Progress Trust Fund and had paid in \$233 million by December 31, 1965. Finally, the United States has committed \$900 million of the \$1,119 million subscriptions to the Fund for Special Operations, and by December 31, 1965, had paid in \$75 million of the \$109 million paid-in capital.

It should be pointed out that both the IBRD and the IDB also raise funds for loans by sale of bonds in the international finance markets (39, 40).

AID, IBRD, IDA, and IDB have made loans to Latin American countries of about \$6.5 billion as shown by the figures below. Loans have been made by IDB since 1961, by IBRD since 1946, and for a longer period by AID and its predecessor agencies. Prior to AID, however, foreign loans were made for the United States by the Export-Import Bank. Information on agency loans is as follows (89, 91, 92):

	<u>AID</u>	<u>IBRD and IDA</u>	<u>IDB</u>
	----- Million dollars -----		
Total agricultural loans by agency (World) -----	2,833	2,562	1,525
Total designated for agriculture (Latin America) -----	153	141	339
Not disbursed -----	58	64	190
Disbursed -----	95	77	149
Repaid -----	1	32	5
Outstanding -----	94	45	144
Loans specifically for agricultural credit (Latin America) -----	97	10	57

Loans in Latin America designated specifically for agricultural purposes by AID up to September 1966 amounted to \$153 million of its world total of \$2,833 million. Agricultural loans by IBRD and IDA were \$141 million of \$2,562 million, and those for agriculture by IDB were \$339 million of \$1,525 million. There is, however, some doubt about the classification of some of the loans. Some made under more general headings may have been used, in part, for agricultural purposes. On the other hand, some included in the tabulation above were designated by such titles as "agricultural and industrial development."

Of the loans authorized for agriculture, \$97 million from AID, \$10 million from IBRD and IDA, and \$57 million from IDB were specifically designated for agricultural credit.

It may be assumed that the bulk of the loans for agricultural credit either reached the farmers or strengthened credit agencies that make loans to farmers. Other loans for agriculture were for a wide variety of purposes, including irrigation projects, resettlement operations, agricultural planning, agricultural colleges and experiment stations, and purchases of livestock and machinery. These were all, no doubt, commendable purposes and beneficial to farmers in the long run although not necessarily of immediate benefit to them.

AID devoted the greatest proportion of its agricultural loans to agricultural credit and a high proportion of IDB loans were also for agricultural credit. A higher proportion of the loans of IBRD went for heavier types of activity such as irrigation work.

Credit Cost

The bulk of the farmer's capital consists of fences, drains, livestock, fruit trees, and other farm produced goods, but it would be difficult to assign any definite cost figures to these items. Costs for this type of capital consist chiefly of wages paid to farm laborers while they are working on fences, planting and caring for trees, and so on, and the farmers own time and work. Much of this work is performed during slack seasons of the farm year when there is little or no work to do on the current crops. This complicates the cost problem even more.

Capital that is borrowed, including equipment purchased on credit and working funds, has to be viewed largely as complementary and marginal to goods already on the farm. The cost of this portion of the capital is traditionally high in Latin America. Its cost to the farmer, however, is not limited to the interest rate because of high risk and administrative expenses.

As may be expected, gross interest rates vary from country to country and respond, among other influences, to the rates of inflation.

In Costa Rica, the prevailing rate paid by farmers is 6 percent on funds borrowed from banks and designated for agricultural purposes. Funds borrowed from the Banco Hipotecario (Mortgage Bank), however, may be raised by sale of bonds paying 7 percent. These funds are loaned to farmers for 8 percent. In addition to the usual interest charge, there are various fees and commissions, including a charge for registration of the debt, stamp taxes for various purposes, fees for inspection of the property, and other charges. Most of these vary with the size of the loan. On a mortgage loan of 10,000 colones (\$1,500), these charges add up to 2 percent of the principal. If the loan is for 100,000 colones, extra charges amount to 1.25 percent; if it is for 200,000 colones, they come to 1-1/8 percent (72). On a loan made from the Bank's ordinary funds, there is a charge of 1 percent and an added one-half of a percent if the loan is renewed. Loans made to small farmers through local credit unions are exempted from these charges.

Coffee growers may borrow funds for current operations (or for harvesting and marketing the crop) either from banks or through the coffee processors. In the latter case, the processors obtain the funds from the banks for 7 percent and loan them to the farmers for 8 percent. Many farmers prefer this method of borrowing because there is less formality and delay.

In obtaining a loan, the farmer must make formal application on officially stamped paper which adds another small expense. In the application, information is required on the purpose of the loan, property of the borrower, the borrower's estimated future income and expense, and so on. The application may be presented directly to the central office of one of the nationalized banks or submitted through a branch of the bank. Or it may be sent in through one of the local credit unions. A small loan application may be granted by the branch bank. A large one must go to the central office. The process may require 5 days (for a small loan with collateral, if requested directly from the central office) up to 2-1/2 months (for a mortgage loan for a small farmer, if requested through a credit union or through the Agency for Credit to Small Farmers).

The process just described involves time and trouble for the farmer, and expense as well if he has to make several trips to town for the purpose. It is, however, typical of most countries of Latin America. In fact, the Costa Rican process is considered one of the least complicated. In addition, Costa Rican interest rates are among the lowest. This description of the procedure and incidental expenses will, however, serve to emphasize the fact that the interest charge is by no means the only cost of obtaining farm credit.

In other Central American countries and in Venezuela, interest rates on farm loans are comparable to those in Costa Rica. In Honduras and Guatemala, with their relatively scarce capital, interest is slightly higher. (These countries are in the group which have had little or no inflation in recent years.)

In Mexico, Colombia, and Peru, where there has been moderate inflation, interest charges are somewhat higher. In Colombia, the rate from ordinary banks on 90-day loans is around 10 percent. Funds specifically designated for agriculture are loaned by the Caja Agraria at the following rates, plus some fees and charges--6 percent for a short period, 8 percent for an intermediate period, and 9 percent for a long period. In Peru, commercial loans by banks are made for 14 to 18 percent. Special loans to farmers are made at 10 percent.

In countries with rapid inflation, the gross rates have been well above those in Central America. In Brazil and Chile, the nominal rate charged on supervised credit has been around 9 or 10 percent. Nine to 12 percent was charged recently on loans to farmers by government agencies in Argentina, Chile, and Bolivia, although this was much below either the commercial rate or the rate of price increase caused by inflation. These low rates represent government subsidies to agriculture made with the limited amounts of available funds.

The rates charged by banks in Chile in 1962 were usually about 15 percent, and in Brazil in 1965, about 24 percent. Loans made to farmers by commercial firms on the purchase price of equipment or supplies were at the commercial rates. Also, the dealers usually charged higher prices for articles sold on credit than for cash. Furthermore, such commercial loans were usually for short periods within the production year.

The concessionary rates charged farmers for government funds bring but little advantage to farmers. In the first place, but few farmers actually receive such loans. Second, such concessionary loans discourage banks and commercial agencies from developing a sound commercial market for farm credit. Third, such rates result in a maldistribution of the limited capital supply. When some funds in Brazil or Chile are loaned for uses that earn only 10 percent, other opportunities that might have produced 15 percent or more are left unsatisfied. Thus, the concessionary rates result in a disequilibrium in the capital market, so that there is always a shortage of credit.

FARM PRICES AND MARKETING

Farm profits are determined by the relationship of prices of the things the farmer must buy and the prices he receives for his products. The decision as to which crops to plant and which livestock to raise depends on their relative prices after consideration of expenses, yields, and production problems on his specific farm. The same principle requires that he select equipment and materials with regard to their prices, compared with the prices expected for his farm products.

Of course, no economy is without friction, and the farmer encounters many impediments in putting his plans into effect. In addition, there is plenty of room for error in making the plans in the first place. This is true even if he receives correct, forward-looking information. Often the market information is in error or does not get to the farmer. Consequently, production planning at the farm level can be expected to go wrong much of the time.

General Price Influences

Latin American farmers generally find themselves producing for a competitive market but compelled to buy supplies and equipment from industrialists and dealers who occupy positions of monopoly or oligopoly.

For at least a quarter of a century, economic policy in Latin America has been to encourage or force industrialization. Under the circumstances, this is a rational objective. Since more people are employed in farm production in most of the countries than are actually required, it is necessary for some of them to shift to other activities. This is obviously a difficult task, especially in the early stages of the changeover, and there are but few skilled economic practitioners among Latin American officials to guide it. Greatest consideration under the circumstances has nearly always been given to the demands or protests of dominant political or industrial groups.

Some 40 or 50 years ago the dominant politico economic group consisted largely of owners of large farms who lived on their land for most of the year. Many of the children and grandchildren of these people still own this land even though they have moved to the cities where they are industrialists, lawyers, doctors, merchants, and so forth. The operation of the land, however, has become a secondary activity with this group and is generally entrusted to hired managers. Consequently, dominant influence on economic policy is no longer exercised by large landowners, except insofar as some members of the urban groups just mentioned happen to own land. It is exercised instead by commercial and industrial groups, especially industrialists.

Latin American and agricultural associations fall chiefly into two groups. One consists of those whose interest it is to obtain the greatest margin between prices paid to the farmer and those received from the processor or from the foreign buyer. In addition to farmers, this group usually includes persons of related commercial and industrial interests such as dealers, processors, or exporters of such commodities as sugar, coffee, wheat, cotton, wool, or cattle.

The other group consists of organizations which are supposed to represent farmers in general. These associations in Latin America have had great difficulty in obtaining needed funds for organization and operation. The deficiency is usually made up by subsidies from the governments.

Industry and commerce, especially industry, have grown rapidly protected by high tariffs, import quotas, licensing systems, direct import prohibitions on competing products, restrictions on use of foreign exchange, and other measures. In some countries, applications for import licenses must be approved by committees which include representatives of the local industries with which the imports will compete.

Industrialization

Starting out with very few industrial plants 30 or 40 years ago, the larger countries, such as Brazil, Argentina, Mexico, and Colombia, have developed numerous sizable factories. It is still difficult, however, to dispose of an output of one product sufficient to keep more than one or two plants in operation in one country. Hence, when the industrial output is examined in detail to determine just who produces specific products, such as sulphuric acid, hydrochloric acid, caustic soda, newsprint, chemical paper, steel sheets, nuts and bolts, telephone equipment, refrigerators, television sets, light bulbs, asbestos roofing, and so on, it is found that in most countries there are only two or three producers of each product, and sometimes only one.

The fear of monopoly is not developed in Latin America, at least not concerning companies that are locally owned. The important thing to local planners and officials has been to obtain factories. That low prices and abundant supplies are more important than the mere presence of factories is not often considered. It has long been realized that somehow a start toward industrial development must be made. Many of the early plants were found to be too small to be really efficient, and often they were equipped with outmoded or secondhand machinery. To keep such plants in operation, further and higher protection was often necessary.

A good illustration of the lengths to which officials have been led by the fear of foreign competition and lack of concern about monopoly is seen in one of the agreements establishing the Central American Common Market (CACM). Under the Convention on Central American Integrated Industries of June 10, 1958, it is provided that, upon application by a firm, a Charter of Integrated Industry may be issued granting it what is essentially a monopoly of a specific industry in the five member countries. This is supposed to protect the favored firm against either foreign or regional competition. It is supposed that the Charter of Integration for various industries will be distributed more or less evenly among the five member countries. Only a few such charters, however, had been issued by the end of 1967. There are also certain other devices in the CACM system, likewise designed to stimulate industrial development by protecting local firms from competition (24, 55, 70).

The Committee of Nine of the Alliance for Progress pointed out that the Regime of Industrial Integration developed more slowly than expected, encountered many difficulties, constitutes a tacit acceptance of monopoly, and may lead to abuses and to excessive costs for the consumer. The Committee further stated that there should be combined with the Regime a means of defending the consumer (35, 36, 92).

The Latin American Free Trade Association (LAFTA) offers an interesting and promising means for expanding the markets required by modern industrial plants. LAFTA was organized in 1960 by Argentina, Brazil, Chile, Mexico, Paraguay, Peru, and Uruguay and was later joined by Colombia, Ecuador, and Venezuela. It provides a mutual agreement to liberalize trade among member countries, and an agreement to reduce duties to zero on about 175 items by 1973. By 1965 concessions had been granted on some 3,700 items, mostly manufactures or semimanufactures. Trade among LAFTA countries more than doubled from 1961 to 1965, and the percentage which intra-LAFTA trade constituted of world trade of the same countries increased from 6 or 8 percent to 12 or 14 percent.

In addition to the development of LAFTA, the presidents of the Latin American countries, at a meeting at Punta del Este in April 1967, agreed to the formation of a Latin American common market. This is to be initiated by 1970 and in full operation by 1985. In addition, the Latin American common market is gradually to be merged with the CACM.

The LAFTA agreements apply more to manufactures than to agriculture. In the agricultural sector, a spirit of nationalism is still stronger than the desire to integrate on most items. Consequently, there are escape clauses which permit countries to withdraw concessions on agricultural products if they believe that such concessions are injurious to their national economies.

The LAFTA agreements hold out to each member country the possibility of obtaining industrial goods with lower tariffs and other import charges when such goods come from other member countries. Up to 1966, however, only a few of these countries had factories capable of producing such things as the more complex farm machines. Where such factories exist, their products may not be of designs or materials as satisfactory to the farmer as were the corresponding items imported from nonmember countries. The lower tariffs on these products from other LAFTA countries however, give the farmer in a small unindustrialized country little choice but to buy them rather than products of countries outside the LAFTA group. Most of the LAFTA increase in trade between 1961 and 1965 occurred among the larger countries, Argentina, Brazil, and Mexico.

An illustration of the difference that the LAFTA agreements may make in a small, rural country may be observed in the charges levied against imports in Paraguay in 1966. In that country, the importer of goods from non-LAFTA countries had to pay import duties on most articles and also consular fees, certain other charges, and a 30-percent charge for the needed foreign exchange. However, most of the farm equipment imports from LAFTA countries were exempt from the charge for foreign exchange and from most or all of the import duties. Consequently, charges on imports from LAFTA countries in

1966 amounted to only 5.5 percent of landed cost on hoes, spades, sickles, machetes, plows, harrows, seeders, cultivators, barbed wire, galvanized roofing sheets, and some other items. But if these articles had come from a country outside the LAFTA group, charges would have been 41.5 percent on most of the items, and 62.5 percent on the roofing sheets. On smooth fencing wire, the charges were 15.5 percent from LAFTA countries and 41.5 or 51.5 percent from other countries. On corn shellers and feed grinders, the rates were 17.5 percent from LAFTA countries and 41.5 percent from other countries; on truck bodies, they were 58.5 and 92.5 percent; on wheelbarrows, they were 47.5 and 71.5 percent.

Effects of Government Controls

The process of urbanization is undoubtedly necessary for Latin America. It brings along with it, however, many influences that do not promote interests of farmers. The general orientation of governments has shifted in favor of urban interests. The price structure results in high rates of industrial and commercial profits and high costs to farmers.

Prices received by farmers for exported products are subject to adverse influences to as great an extent as are the prices they must pay for imported supplies. Export products must be sold on world markets in competition with products from other countries. There are high marketing costs on products for local consumption, and in some cases the products are subjected to upper price limits imposed by government regulation.

There are exceptions to the prevalent policy of levying high import duties and similar charges against imports to protect the domestic producer. Most of these apply to food products which are not produced in sufficient quantity within a given country. In Mexico and in Brazil, government agencies are charged with responsibility for purchasing supplies of food products when prices to consumers seem unreasonably high, and distributing such supplies at reasonable levels to urban consumers. This is sometimes to the farmers' advantage. But the objective is to keep the retail price level low--not to keep farm prices high. In Argentina, for a number of years it was the stated policy of the Government to keep food prices as low as possible to consumers. In virtually all the countries, one of the stated objectives of agricultural policy is to provide raw materials for local industries. This is intended to keep prices for local supplies below those of imports.

Although these specific regulations may at times be to the disadvantage of farmers, farmers could not afford to dispense with government controls even if it were possible to do so. There are too many ways in which they need assistance. Research and extension work are needed, although farmers themselves seldom seem to think much about it. Assistance is needed in obtaining credit when credit is available. Protection is needed from unprincipled dealers in supplies and equipment. Guarantees of minimum prices for farm products are demanded in most countries, although action in this direction has seldom been effective.

Farmers are thus placed in a dilemma concerning government controls. Since they are highly individualistic people, they are apt to resent interference by anyone outside their farms. Their experience with government agencies has not been uniformly happy. The formation of government policy is already subject to strong urban influences, and this will increase as the population balance continues to shift toward the city. Defense against undesirable aspects of regulation and control could come from a strong organization of farmers, independent of government influence or subsidy. But with two or three exceptions, this is not in the visible future.

Prices of Equipment and Materials

Labor in Latin America is cheap (sometimes extremely so) in comparison to the price of farm products, and so are prices of a few other production elements. Horses and

oxen are cheap and so is pasturage and forage. On the other hand, most farm machinery, automobiles, tractors, and tractor fuel are high priced.

Therefore it is advantageous to use labor and draft animals quite freely in the organization of the farm and to adopt mechanical equipment and power only where it has a strong advantage. Nevertheless, mechanization of farms is progressing rapidly in most countries. There are at least four reasons for this: Labor performance is very low with the primitive methods and handtools commonly used; modern mechanical equipment is more flexible than animal power in some ways and can be worked longer hours in the busy seasons; power equipment does work of better quality in seedbed preparation and in crop cultivation than do horse or ox-drawn implements; and the increasingly independent attitude of laborers makes them more difficult to manage than was previously the case, especially on large farms.

Farm Equipment

Just how much more expensive farm implements are in Latin America than in the United States or Europe is hard to say, partly because of differences in machine design and quality. The general facts, however, seem indisputable.

Two good analyses of costs of farm equipment (for Argentina and Chile) have been made by ECLA with support of the IDB and the FAO (25, 26, 35, 77, 93, 94). In Brazil, prices of farm implements are collected currently by the Secretariat of Agriculture of the State of Sao Paulo. In Paraguay prices are available at the Banco Nacional de Fomento which sells a fairly wide range of tools and implements. Similar data could no doubt be collected in other countries. Problems of comparability of data, however, would remain.

According to the ECLA study, a 30- to 40-horsepower tractor that would cost the equivalent of \$2,400 in England, would sell for \$4,930 in Chile, although the import duty would amount to only 6 percent. A three-disc plow would cost the farmer the equivalent of \$284 in England but \$719 in Chile. An 8.5-foot combine-harvester would cost \$6,986 in England but \$15,158 in Chile. Of course, there are expenses for crating and shipping such implements to Chile, but most of the difference seems to be in price margins to the dealers (appendix table 12).

In Argentina, the Government has tried since the early 1930's to induce implement manufacturers to establish plants for making farm machinery. About 1952, it applied strong measures to discourage and then to prohibit imports except under special approval. Contracts were made with four European implement manufacturers authorizing them to establish tractor assembly plants coupled with what was practically a prohibition against the importation of competing tractors. The favored firms had to agree to manufacture increasing percentages of component parts in Argentina until the value of parts made there would be about 90 percent of the price of the tractors placed on the market. The arrangements were, however, unsatisfactory and very few tractors were actually made. Indeed, the suspicion grew that the contracting firms were more interested in getting a foothold in the Argentine farm machinery market than in manufacturing tractors. Consequently, the first set of contracts was canceled. Import restrictions were somewhat relaxed, although duties, discriminatory rates on foreign exchange, and other charges still made imports almost impossible.

In the early sixties, two U.S. implement firms began to produce farm machinery in Argentina, and the situation has since become somewhat easier. In 1964, however, a tractor of 55-horsepower at the pulley still cost the equivalent of \$7,320 in Argentina, compared with \$3,038 in the country of origin (Great Britain). The disproportion between Argentine prices and foreign prices of some repair parts was even greater.

Brazil has also followed a policy of discouraging imports of articles that could be manufactured within the country. Its restrictions, however, have been considerably less

severe than have those of Argentina. With its larger potential market, it has, in fact, fared better in establishment of new factories. Prices of farm equipment in Brazil are, in general, somewhat lower than those in Argentina--although still well above farm implement prices in the United States or Europe.

A strong barrier to mechanization of farm work is found in the relatively high price of tractors, compared with the prices of work horses or oxen. A tractor of 30 to 39 horsepower at the pulley cost the farmer around \$5,000 during the early sixties. A work horse in Argentina, in contrast, cost only the equivalent of \$26. Thus, the tractor costs almost as much as 200 horses. In Paraguay during this period, work animals were nearly as cheap as in Argentina. In Brazil, however, the price of a work horse in Sao Paulo was over three times as high as in Argentina. Expressed in dollar equivalents, it required the price of about 60 horses in Sao Paulo to equal that of a 40-horsepower tractor.

After the tractor is purchased, its operating cost further discourages its use. In the early sixties, tractor fuel in Argentina cost 25 percent more than in the United States; in Brazil, with an even greater scarcity of petroleum, the cost of tractor fuel was 50 percent more than in the United States.

Paraguay has no farm implement factories. It is a member of the LAFTA, however, and gives a strong trade preference to other LAFTA members which include Argentina and Brazil. Farm implement prices in Paraguay, for the most part, run higher than in Brazil, and on many items where comparison can be made are comparable with those of Argentina.

In all four of these countries (Argentina, Brazil, Paraguay, and Chile), livestock production is one of the most important agricultural enterprises. Barbed wire, needed for fencing livestock, is manufactured in Brazil as well as Argentina, and costs the equivalent of about \$15 a roll of 50 kilos (110 pounds), compared with \$10.70 a roll in the United States.

Fertilizer

A few years ago, the author was told in Argentina that farmers there did not use fertilizer because it did not pay. Further inquiry showed that rather large increases in yields of grains were obtained from fertilizer, but still agricultural authorities insisted that its use did not pay. The reason became clear after a comparison of prices. A ton of superphosphate delivered to a farm in northwestern Buenos Aires province cost the farmer the price he would receive at the farm for more than 5 tons of wheat. Transportation and handling charges between the farm and Buenos Aires explained only a small part of the price spread. At the same time, a ton of superphosphate delivered to a farm in central Kansas cost the Kansas farmer less than the price he would receive at the farm for 1-1/2 tons of wheat. In other words, the Kansas farmer would find it profitable to apply the phosphate to a marginal point where the resulting increase in yield was about 1-1/2 tons of wheat, while in the Argentine region, application became unprofitable if the increase in yield were less than 5 tons.

In the early sixties, there were but few dealers or mixers of fertilizers in Argentina. Except for slaughterhouse waste, all fertilizer used was imported. The Government charged a 20-percent import duty on fertilizer materials or 40 percent on mixed fertilizers. The result was that fertilizer was sold only in very small lots and at high prices and was used only on such intensive crops as vegetables, fruits, sugarcane, and tobacco.

Recently, the Government has changed its policy and lowered or removed the import duties and is encouraging wider use of fertilizers. Consequently, consumption has risen sharply, and, as farmers become aware of the potential advantages of fertilizer, prospects are that its use will increase much further. ECLA and FAO, in a study of the use of

fertilizers, estimated that consumption of plant nutrients in Argentina in 1970 might well be over twice the consumption in 1964-65, and by 1975, over four times that level (30). The expense per ton of importing urea in 1964, as detailed in that study, was as follows:

<u>Cost of fertilizer at origin</u>	<u>Dollars</u>
Cost of fertilizer plus freight to Buenos Aires-----	96.55
Expense for foreign exchange-----	8.50
Customs expenses -----	2.96
Unloading, storage, haulage -----	5.81
Miscellaneous, including reserve for losses -----	4.14
Sales commissions and bonuses -----	6.49
Margin to dealer-importer-----	<u>22.66</u>
Total sales price-----	147.11

Note that expenses after the fertilizer reached Buenos Aires amounted to the equivalent of \$21.41 plus \$6.49 for sales commission and \$22.66 margin for the importer-dealer, a total of \$50.56. These charges add up to more than 50 percent of the cost in the country of origin plus freight and insurance to Buenos Aires. In addition to this, there was the expense of shipping or hauling the fertilizer to the farm.

In Brazil, total consumption of fertilizer increased 244 percent from 1950 to 1960. Thereafter, there was some actual decline because of an unfavorable shift in the ratio between fertilizer prices and prices of farm products. This was caused largely by a discontinuance of a subsidy paid for fertilizer use and the reimposition of import duties of 30 to 40 percent.

Low rates of consumption may be attributed to high expenses and marketing margins and to low prices received by farmers for crops.

Heaviest fertilizer use is in Sao Paulo. In that state, the trade is better developed, and there are more favorable prices for farm products as well as for fertilizers. In addition, transportation facilities are better, which means that price spreads are reduced between farms and markets. A further factor contributing to heavier use of fertilizer is that more information on effects of fertilizer use has been worked out by the experiment stations of that state. The Campinas experiment station is one of the few that has made available data which permit determination of the curves of increasing and diminishing returns from fertilizers on maize for certain groups of soils (100).

In Minas Gerais, conditions are less favorable to use of fertilizers, and price relationships are less advantageous. Transportation facilities are poorer, in general, than in Sao Paulo, and distances from markets are greater. In a series of tests with fertilizers on maize conducted by ABCAR in the State of Minas Gerais, it was found that net returns were decreased by fertilizer applications. This was despite large increases in yields--up to 45 percent with one fertilizer combination. The reasons were high fertilizer prices, high transportation charges, and low prices for the maize.

About three-fourths of the fertilizer used in Brazil in recent years has been imported. Local facilities for production of nitrogen from the steel and petroleum industries, however, promise to supply current local requirements within a few years. For phosphates, there are several local sources--although only one, in Pernambuco, was of importance up to 1965. No local source of potash is known.

Most Brazilian soils are poor in minerals and especially in phosphorus. Consequently, it would be advantageous to develop the local sources of phosphates, providing mining costs are low enough and the available percentage of phosphate is high enough. At present, the costs of mining local phosphate rock or producing acid-phosphate are well above

corresponding mining costs in the United States or Europe. A summary of costs in 1965 of mining, grinding, and shipping a ton of phosphate rock from the Pernambuco deposit to Sao Paulo is shown in appendix table 13. When loaded on a coastal steamer at Recife, its cost, according to the CEPAL study, was the equivalent of \$16.96. By the time it was sold in Sao Paulo, the cost had climbed to \$53.91; this was reduced to a sales price of \$45.40 by a subsidy to the fertilizer industry. The cost was increased by high freight rates on the Brazilian-owned coastal steamship line, by high expenses for loading and unloading, and by numerous taxes, fees, and charges all along the line. This fertilizer would have cost around \$7 a ton f.o.b. Tampa, Fla.

On a ton of muriate of potash purchased in Canada, cost, insurance, and freight to Santos was very little more than on the phosphate from Recife which is about one-fifth or one-sixth the distance from Canada. On the muriate or other imported fertilizers, there was also a charge for obtaining needed foreign exchange plus financing charges and the usual high margins for distribution and profits.

The authors of the ECLA report believed that price of the muriate could have been reduced by as much as 40 percent if the Government had removed the taxes involved and reduced to more reasonable levels the freight rates charged by the state-owned coastal ships, port charges, and financial charges (27, 28, 32, 100).

Similar reductions seemed feasible for the phosphate and other fertilizers as well. Such a reduction would have greatly increased the use of fertilizers and also raised agricultural production and the farmer's income potential.

In the United States, by way of comparison, phosphate rock was costing farmers an average of \$21 a ton in 1965, and muriate of potash, \$53.60 a ton. These represent prices at the farm, however, whereas the Brazilian prices mentioned were at Sao Paulo and with cost of shipping to the farm still to be added.

Chile constitutes an exception to the general policy of adding numerous costs to fertilizer prices. Since 1952, the Chilean government has paid varying amounts of subsidy on fertilizers to encourage their use and lower the costs of food crops. Unfortunately, according to an ECLA report, part of the benefit of the subsidy has been lost by three circumstances: It has been very expensive to the national treasury; it has obscured the fact that the system of distribution is inefficient; and, since studies of the effects of fertilizers on yields and of their economic effects are very inadequate, farmers have used the wrong kinds of fertilizer in many cases. As one evidence of this, consumption of some relatively low-grade fertilizers has been much above the level justified by the prices of the plant food that they contain--that is, farmers have tended to buy the cheapest fertilizers rather than those their land has been most in need of.

Chile has been producing about 150,000 tons a year of potassium nitrate and a million tons of sodium nitrate--the well-known Chilean nitrate. In recent years, consumption of potash and phosphates has doubled and that of nitrates trebled. Consequently, Chile is consuming about 20 percent of its nitrate production. A small amount of potash is produced as a side product of the nitrates. There is also a small production of phosphate. But local resources of these two elements are limited.

Recent changes by the State Bank, in practices of purchasing fertilizer materials abroad and in local pricing practices, have reduced the fertilizer bill and the burden of the subsidy on the treasury. Most of the gain, however, has been offset by increases in prices of fertilizer at the foreign sources.

In Colombia, use of fertilizer has been increasing rapidly. From 1955-59 to 1960-64, consumption of nitrogen rose by 85 percent; of phosphoric acid, 26 percent; and of potash, 42 percent. Even so, it is estimated that following these increases only 16 percent of the area in harvested crops received any fertilizer. Principal crops fertilized, in order of tons consumed in 1963, were potatoes, irrigated rice, export bananas, cane for centrifugal sugar, wheat, barley, cotton, and vegetables. These crops received an estimated 80 to 90 percent of the chemical plant nutrients used. It is interesting that relatively

little coffee or corn received any fertilizer despite the great importance of these two crops in the country's agriculture (32).

The ECLA study gives estimates of the "ideal" consumption of fertilizers. These represent opinions obtained by the Ministry of Agriculture from a survey of agronomists and agricultural organizations. The figures are about four times as great as the amounts used in 1963.

Increases in yields from fertilizer applications on some crops are shown in the report. These vary from 40 percent on potatoes to 200 percent on maize and improved pastures. Some progress has been made in determining the curves of diminishing returns with successive doses.

Although there is little difficulty about importing fertilizers and there are some 20 fertilizer-mixing plants in the country, prices are relatively high when compared with those in other countries. Representative fertilizer prices in dollars per kilogram of plant nutrient in Colombia in 1963 and three other countries for 1961 were as follows (29):

	<u>Colombia</u>	<u>Argentina</u>	<u>Chile</u>	<u>England</u>
	<u>1963</u>	<u>1961</u>	<u>1961</u>	<u>1961</u>
N in sulfate of ammonia-----	.590	.385	--	.279
P ₂ O ₅ in triple phosphate ----	.334	.268	.223	.219
K ₂ O in muriate of potash ----	.258	.167	.202	.100

Domestic production of nitrogen in 1963 amounted to 83 percent of consumption from two plants producing fertilizer from natural gas and waste from the petroleum industry. Small amounts of phosphates were produced from slag at one steel plant.

Composition of sales prices of imported fertilizers at Bogota are shown in appendix table 14. In 1963, sales prices were nearly three times as high as the c.i.f. costs of the materials at Cartagena on sulphate of ammonia and superphosphate, and more than three times as high on muriate of potash. Importers obtained a margin equivalent to \$22.22 per ton of the sulphate of ammonia and superphosphate and \$27.78 on the muriate of potash. Distributors' margins were even greater. This explains why the use of fertilizer in Colombia is not growing faster than it is.

In Paraguay, very little fertilizer is used except on intensive and high-value crops such as citrus and tobacco. Farmers and agronomists have said almost unanimously that for other crops it does not pay.

In the early part of 1966, the Banco Nacional de Fomento, which sells some supplies and equipment to farmers, was holding several hundred tons of fertilizer in its warehouses. This had been bought by the bank with money obtained by an international loan to make the fertilizer available at a lower price. The price the Bank was asking for fertilizers with formulas of 12-24-12 (12 nitrogen, 14 phosphorus acid, 12 potash) or 15-15-15, however, was equivalent to \$158.70 per ton. At the same time, an importer who stated that he obtained his supplies from Germany for the equivalent of around \$70 per ton f.o.b. was selling a very similar formula for the equivalent of \$150. It is hard to see how shipment and handling of the fertilizer from Germany could cost more than \$20 or \$25 per ton.

At the time fertilizer was selling for \$159 a ton in Paraguay, just across the river in Argentina it was selling for about \$135 a ton, a price which allowed the dealer an ample margin of profit. (In the United States at the same time, the price was \$75 or \$80 a ton.) Lowering the price of high-test fertilizer in Paraguay to the price prevailing in Argentina would greatly increase the amount used and raise the agricultural potential of the country.

Considerable space has been used in discussing prices of fertilizer, not merely because it is capable of increasing production and farm returns in its own right, but also because it is an essential element in raising the general level of the entire farm enterprise. Agronomists, however, still have much work to do in determining just which fertilizer elements are needed and what the curves of diminishing returns for each element are for each of the principal soil groups of the respective countries.

From observation, it is believed that the general patterns described for the five countries covered in the past few pages are reasonably representative of the rest of the region.

Pesticides and Herbicides

One of the farmer's lifelong problems is the loss caused by plant diseases and insect pests. Another is the unending struggle against weeds. Consequently, chemical pesticides and herbicides have found a ready and growing demand.

As with fertilizers, prices of pesticides in Latin America are greatly increased by taxes, by wide price margins taken by dealers, and by laborious and expensive methods of handling such products.

Consumption of these products in Chile nearly doubled between 1961 and 1963. Most of the component chemicals came from the United States and West Germany, with only small amounts of some standard products manufactured in Chile. There seems no reason, however, why pesticides and herbicides cannot be made as well in Latin America as elsewhere, especially considering the advantage given to manufacturers by agreements within LAFTA.

Analysis of prices of pesticides is made difficult by the very large number of chemical formulas, the wide variety of proprietary brands, and the differences in concentration and in units quoted. A joint study by ECLA, FAO, and IDB showed that there were some 450 different pesticides offered for sale in Chile in 1963, and that 870 were registered in Colombia in 1964 (34). Most of these, however, represented merely trade names for more or less standard products.

For five imported pesticides, the study showed that sales prices represented 180, 228, 266, 273, and 320 percent of the c.i.f. cost. Import duties and sales taxes accounted for 15 to 23 percent of the sales prices. Margins to importers were 14 to 37 percent, and margins to distributors were 14 to 20 percent. Taken together, taxes and margins thus amounted to an average of nearly 150 percent of c.i.f. costs.

A comparison of prices on some standard pesticides and herbicides in Chile and in Great Britain showed that in Chile the price of one herbicide was 145 percent as high as the price in England. On three other herbicides, prices in Chile were 228 to 277 percent as high as those in England and an insecticide with a mineral oil base was 488 percent as high.

In Colombia, insecticides and fungicides have been used in considerable volume for some years, especially on such crops as cotton, potatoes, and tomatoes. In 1964, 56 percent of the active ingredients in insecticides and 42 percent of all pesticides were used on cotton. Total active ingredients in pesticides consumed in 1963-64 were estimated at 8,100 tons. Most of them were compounded or mixed in Colombia from imported materials. There were at that time seven major firms importing ingredients, and six or seven major firms and many more minor firms engaged in compounding the finished products.

Before March 1966, under the Government's policy of encouraging development of local industries, import regulations and prices made it nearly impossible to import insecticides or other pesticides ready for use. In addition, there were high duties on the materials imported. Farmers complained of the resulting high prices as well as the low quality of some domestic products. In 1965 and early 1966, strong complaints were

made by the National Cotton Growers' Federation concerning prices and also concerning losses of cotton caused by a shortage of insecticides.

In March 1966, the Government modified its policy somewhat. Import duties on solvents, emulsifiers, and similar materials were lowered from 60 to 35 percent, and those on insecticides, fungicides, and herbicides not in condition for retail sale were lowered from 30 to 15 percent. At the same time, the Government raised the foreign exchange rate on dollars for imports of such materials from 9 to 13.5 per dollar. This action offset any benefit to the farmer from the lower tariffs, and the lower import duties benefited only a few compounders.

From such data as were available to the ECLA group, however, the prices charged to farmers for pesticides in Colombia were similar to those in other Latin American countries. There was, however, much price variation among the various items.

Pesticide prices in Brazil and in Paraguay seem to be in line, as a general thing, with those in the other countries, but with many variations. For various reasons, comparisons are hard to make. Quotations are usually in terms of kilos of powder, but they may refer to solutions or mixtures.⁶ The units quoted vary and prices may be quoted in liters or gallons. Furthermore, the concentration may be anywhere from 100 percent to a fraction of 1 percent.

Administered Prices

It is apparent that prices of farm machinery, fertilizers, and pesticides belong to the category of administered prices. They are determined within a certain range by the directors of the manufacturing enterprises for a given type of product. These enterprises are seldom very numerous, and each one produces a sizable fraction of the supply involved. Each manufacturer is, however, subject to competition by a limited number of other producers of the same or similar products. His price can exceed the competitive level, but it cannot be far out of line with prices charged by other producers or he would lose his market. Thus, the situation is one of oligopoly. Price is indeterminate and is above the level that could be expected in a competitive market under conditions of normal supply and demand.

There is more than one producer of tractors or grain combines or of a given type of pesticide in each large country. Likewise, there are producers of tractors, for example, in the United States and also in England, Germany, France, and other countries. Consequently, it might be thought that an importing country would be in a favorable position to obtain low prices on imported tractors despite the price administration within each individual country. At this point, however, there enters a complication that might be called compound price administration--administration by the local governments. The Latin American countries are all determined to force industrialization, and, therefore, grant strong protection to manufacturers. Where there are domestic manufacturers, this prevents the importer from exploiting the advantages of competition among the manufacturers in outside countries. In addition, where the equipment or fertilizer is actually imported, it has to pass through a series of steps subject to some control either by corporations or by the government of the importing country.

First, it is necessary to ship the imported equipment or fertilizer by ocean freight, where rates are clearly administered prices. Second, come the import duties, charges for foreign exchange, sales taxes, and various fees and administrative charges, almost all of which are subject to government control. These may add up to a high percentage of the c.i.f. cost. After these come the margins in price taken by importers and distributors who, like the producers, are not usually numerous enough to provide services at rates that are really competitive.

Two ways have been suggested to ensure reasonable levels of prices of goods produced by a limited number of enterprisers. These are to break up the producing units

into such small enterprises that they will really compete, or to treat the large producers as public utilities and regulate their prices (44, 45). However, the former loses the advantage of large-scale production and might well result in higher rather than lower price levels. The latter might raise even more problems.

Neither of these methods would be very helpful in Latin America as the foreign producers are not under control of the importing countries. In most cases, however, there are several manufacturing and exporting countries from which given machines or chemicals can be obtained, so that the importers have several sources from which to choose their supplies. The ECLA studies indicate that there are elements of competition in determining the prices at origin. Also, they show that the portions of c.i.f. prices that are made up of import duties, freight charges, domestic charges connected with foreign exchange, and so on, comprise a large fraction of the landed price. Taking all of these facts into consideration, it would appear that the portion of price in the importing country that is likely to be determined by monopoly powers on the part of foreign producers and exporters is likely to be small on standard machines or chemicals. Or to put the situation in somewhat different words, it seems likely that there are relatively few articles on which foreign producers can derive any great monopoly profit, although it is not denied that such cases exist.

Often, the larger element of the administered price on an imported item is not in the price received by the foreign manufacturer but consists of charges levied by the importing government; these may include import duties, premiums charged for foreign exchange, freight rates charged on government-owned shipping lines, rates on government-owned railroads, port charges, sales taxes, and various other administrative charges and fees.

Farm Commodity Prices

There are relatively few data on prices received by Latin American farmers for commodities. Ministries of agriculture and sometimes newspapers or trade journals publish wholesale prices of principal products. Prices of principal food crops and sometimes of meats are reported in the capitals and some other cities. Such prices are usually well above those actually received by producers. An example will illustrate this.

In the northern part of the state of Parana in Brazil, the minimum price announced by the Government for a sack of 60 kilograms (132 pounds) of corn for 1966-67 was 6,020 cruzeiros. The share the farmer received of the price, however, was only 3,160 cruzeiros. Before the farmer was paid, there were charges and deductions as follows:

<u>Charges and deductions</u>	<u>Cruzeiros per sack</u>
Sack -----	800
Circulation tax -----	360
Cleaning grain -----	300
Grading grain -----	100
Truck to shipping point (60 km.)-----	300
Charge for unloading truck -----	200
Freight to Curitiba (or other terminal market)	800
Total-----	2,860

The terminal price (6,020 cruzeiros) was equivalent to \$1.16 a bushel. But after the various charges and deductions, the farmer received only 60 cents.

Marketing is an expensive series of operations. It is best organized and most efficient for the large-volume export crops such as coffee in the tropical countries or grains in Argentina. It is more efficient for nonperishable articles and is most expensive in percentage of final price for such products as fruits and vegetables. In addition, marketing costs vary more or less inversely with size of farm unit and are high where farms are small and dealers obtain only a small amount of produce from each farmer.

Farm market organization in Latin America is generally chaotic except for the nonperishable export commodities. For fruits and vegetables, there are usually many small local purchasers, truck operators, intermediate dealers, and retail vendors, each of whom handles a very small volume of produce.

Farm-to-market roads are usually unsurfaced and often impassable in rainy weather, thus causing large losses before products can get to market. Storage facilities are usually inadequate and prices fluctuate widely from the end of one harvest to the weeks before the beginning of the next one.

The volume handled by the typical local buyer, trucker, or vendor usually provides him with a rather scanty living, even though margins taken by dealers are wide and account for a large part of the price paid by the final customer.

This means that wholesale prices for farm products in central markets are very inaccurate measures of prices actually received by producers.

The farmers' situation is worsened in most of the countries by lack of current market information. Where there are price reports, they are often issued only monthly. The need for market information is gradually being realized, however, and some new reporting services are being set up.

In Argentina, prices of staple products are quoted in the daily newspapers and are broadcast. In Brazil, market reporting service was established for Rio de Janeiro, Sao Paulo, and Belo Horizonte in 1966 by the Ministry of Agriculture and the secretariats of agriculture for the States of Sao Paulo, Guanabara, and Minas Gerais. This service provides information on market conditions and prices of food grains, vegetables, and meat animals.

Mexico and Venezuela collect information periodically on prices at wholesale and retail levels in larger cities and on prices received by farmers for a limited number of commodities. In Venezuela, reports are published monthly, but the price bulletin does not have a wide circulation.

In Colombia, the National Department of Statistics publishes wholesale prices in Bogota for about 25 agricultural or food products in its monthly statistical bulletin. In addition it makes available information on retail prices for about 20 food products for some 25 cities throughout the country. The Caja Agraria publishes a bimonthly bulletin giving prevailing prices for principal farm products in the larger cities. Because of delay in publication, however, none of these is of great help to a farmer who has a crop or a number of cattle or hogs ready for sale.

In Peru the Servicio de Investigacion y Promocion Agraria (SIPA) issues a market news service.

Other countries have occasional market surveys on individual farm products but do not have general market information services that can tell the farmer where the price for his crop is most favorable or whether a price offered to him is a fair one.

There are frequent demands from farmers for government help in obtaining satisfactory prices for products. Several countries have systems of one sort or another for guaranteeing or controlling prices of a limited number of basic commodities. These have not been notably successful and have been designed more often to limit prices charged consumers than to assure farmers of minimum returns.

Argentina tried for several years to assure cheap food for urban populations by means of retail price laws enforced by the police.

In Brazil, the National Superintendency of Supply (SUNAB) is charged with controlling prices and supplies of basic foods. In 1966, during a shortage of beef in the principal cities, SUNAB attempted to increase the supply by sending out army units to requisition cattle from livestock producers. This was sharply resented by producers and led to increased shortage and general confusion in the cattle market. The effort was quickly abandoned.

Since 1951, Brazil has had a system of support prices for principal farm food crops administered through the Ministry of Finance. These guaranteed prices are announced each year and are used as a basis for determining limits on loans to farmers for crop or livestock production. In a country where there is continuous and rapid inflation and where prices rise 25 or 30 percent each year, however, support prices have virtually no meaning and are of little or no help to farmers.

In Mexico, the National Service for Popular Food Supply (CONASUPO) intervenes in the market to maintain a supply of basic products, especially wheat, corn, and beans. It also purchases and distributes some other foodstuffs if retail prices seem excessive.

Several other countries have laws authorizing the government to control agricultural marketing and maintain prices that are satisfactory both to producers and consumers, a virtually impossible objective. None of the Latin American governments has sufficient current funds to buy up any large fraction of an important crop. In fact, if such large quantities were to be purchased either for seasonal storage or to take part of a bumper crop off the market and raise prices, the problem of what to do with the purchase would be hard to solve. Most of the effort of agencies for price and market control has been applied in the interest of consumers rather than of producers. Some control measures have been rather successful, especially when exports of food crops have been restricted or supplementary supplies have been imported, as by CONASUPO in Mexico.

Appendix table 15 summarizes estimates of prices received by farmers in Latin American countries for eight crops and three livestock products for 1957-59. There are wide variations among countries. Some of this variation is associated with the relative advantages of these crops under different climatic conditions or types of farming. Other variations are the results of policies followed by the government.

Prices received for wheat vary, in the period covered, from the equivalent of \$27 and \$36 a metric ton on the big farms of Uruguay and Argentina to \$130 or more on very small farms or under unfavorable climatic conditions in Colombia, Guatemala, and Brazil.

Similar variation occurs with corn and rice. Prices of corn and rice are relatively high in Venezuela where there is a high-price economy supported by heavy exports of petroleum products and where farm labor is scarce because of the greater attractiveness of employment in petroleum and urban activities. Prices are low in Paraguay which, due to its isolated position, has difficulty in getting its products to outside markets.

Prices of beef are high in Venezuela, Chile, and El Salvador where there is low production of beef per capita. Prices are low in Paraguay where there is difficulty in exporting the surplus. They are low, too, in Brazil which has much low-grade beef and limited consumer buying power. The Argentine prices, although still relatively low, are for high-quality, chilled beef. Prices for beef of this quality would be much higher in the United States.

There is a marked difference in the relationship between prices of hogs and cattle in the United States and in Latin America. In the United States, cattle usually bring higher prices than hogs, but in Latin America hogs usually bring much higher prices than do cattle. This is because of the greater abundance of pasture than of grains or other hog feed in Latin America and also because of sanitary difficulties in raising hogs under tropical conditions. Exceptions are found in Argentina and Uruguay where sanitary conditions are better, feed is more abundant, and more hogs are produced in relatively large-scale enterprises.

Coffee prices constitute a large and interesting subject which can only be mentioned here. In 1957-59, the years covered by the price estimates shown on table 15, the whole-sale price of Brazilian green coffee in New York averaged about \$1,025 a metric ton and Medellin Excelso, representative of a high-quality Colombian and Central American coffee, averaged \$1,160. In contrast, the average prices paid producers in Brazil were estimated at the equivalent of \$426 a ton, and those paid to Colombian coffee producers averaged

\$698. Of course, these latter prices covered much low-grade coffee as well as the high-quality, export coffee. Also, New York is a long way from Santos and from Medellin. But these things do not explain nearly all of the differences between prices in Latin America and New York. Most of the price difference is to be explained, in these two cases, by the fact that part of the foreign exchange from coffee is retained. The extent to which exchange is retained and diverted, chiefly to governmental or industrial purposes, is indicated in appendix table 16.

In Brazil, for the past several years, such diversions have amounted to more than half of the foreign exchange provided by coffee exports. In Colombia, since 1960, the numbers of pesos paid per dollar for coffee exports have been 24 to 43 percent less than the rates paid on other exports. Since coffee is the most important export crop and by far the principal source of foreign exchange in each of these two countries, this diversion of buying power has meant a decided reduction in farmers' income and has probably been used in a large measure to support industrial development of other products.

In Argentina, during the 1950's there were retentions, usually of 10 to 20 percent of the foreign exchange, from agricultural exports. These were later discontinued, except for one-half of 1 percent for support of INTA, the National Institute of Agricultural Technology. Argentina does, however, levy surcharges of 20 to 230 percent on the price of foreign exchange purchased for imports, depending on the degree to which the specific items are considered essential.

Other countries have different systems. In Central America, all the countries levy export taxes on coffee and bananas, the principal exports. There are also export taxes on livestock from Honduras, horses and cattle from Nicaragua, and cacao beans from Costa Rica.

These export taxes on farm products and charges against foreign exchange are of material help to the governments in avoiding the necessity for levying heavier income or property taxes. Without them agriculture would no doubt develop different patterns from the present ones. Elimination of export taxes might be of benefit to everyone except the upcoming industrialists. Taxation of exports is, of course, a very complex question on which there has been much speculation but very little in the way of tangible results.

Marketing

Marketing includes collection of produce from farms, transportation to consuming or processing centers, storage, processing, and, finally, delivery through wholesalers and retailers to the consumer.

If marketing facilities or personnel are inefficient, they may absorb a large part of the retail price and leave but little for the farmer. The subject is complex and will be discussed here only in general terms, since marketing processes differ from one type of product to another and from country to country. Mention will be made only of some of the outstanding problems found in Latin America, especially those that reduce the returns to farmers.

In general, marketing is much more efficient for major export products such as grains, coffee, cotton, wool, and meat for export than it is for products for local consumption, especially those that are perishable.

For perishable produce such as fruits and vegetables, heavy losses are often incurred because of three circumstances: (1) bad roads sometimes make it impossible to get the products to market or cause damage to them on the way; (2) the expense of local collection (especially among small farmers) is likely to be high because on each trip the local dealer is able to obtain only a small amount of produce from each farmer; and, (3) when such produce reaches the consuming center the selling expense is further increased because the produce may pass through the hands of wholesalers, jobbers, and retailers--including street vendors--before it gets to the consumer.

Facilities for grading and storing farm produce are likely to be inadequate. In some countries, nearly all facilities, such as silos or elevators for grains, warehouses for nonperishables, and cold storage plants, are owned and operated by private firms. In others, extensive facilities have been constructed by government agencies.

The most common reason given for government storage construction is that it would lower storage costs. This may or may not prove to be true when expenses to the government are counted. Increased storage space is also expected to reduce price fluctuations from one harvest to another. In some cases, however, public intervention may be chiefly a matter of overenthusiasm on the part of some political or economic group rather than actual need for public operation.

In addition to constructing and operating storage facilities, the government may own or control plants for processing farm products or may control the rates charged by such plants. These plants may be cotton gins, meat packing plants, abattoirs for small cities, coffee beneficios (for processing and grading), or other types. Here again the justification depends on the specific case. Two reasons for Government operation or Government control of rates charged might be excessive charges or unsatisfactory service under private ownership.

Other facilities that the government might own or control are market houses, warehouses, and stores actually used in selling the farm products to consumers or retailers. The reason given for government intervention here might be excessive charges, inadequate facilities, or unsatisfactory sanitary conditions. As population grows, existing facilities will, of course, need to be expanded, but there may be a choice between private construction and construction by government.

Market News Services

In most of the countries, farmers, especially those with small farms, are poorly informed about current market prices. Consequently, they often accept less than they should from truck operators and local buyers. For standard grades of the major products, especially export commodities, daily prices are usually published in newspapers and commercial journals, but prices of locally consumed products may not be quoted.

Until recently, ministries of agriculture seldom issued current market news in forms that were useful to farmers. Many did not issue price reports at all. Other made occasional studies of selected products. Still others published information at such rare intervals that it was of little use to the farmer who had a crop ready for sale immediately and wanted to know where he would be likely to get the best price. This situation is gradually being corrected and various governments are issuing daily market information through newspapers and by radio. As these services expand, returns to farmers should gradually improve.

Cooperative Marketing Associations

In recent years, there has been enthusiasm for cooperative marketing associations. Many cooperatives have been encouraged or subsidized by governments in one way or another. Many of these, however, have either become dormant or have ceased to function.

There are a number of highly successful marketing cooperatives in Latin America. Most of these, however, have developed as a result of special situations. Brazil has the largest number of agricultural cooperatives, especially in the states of Sao Paulo and Rio Grande do Sul. An outstanding example is the Cooperativa de Cotia located in Sao Paulo, with a membership composed largely of small or medium scale Japanese farmers. This organization has had highly efficient leadership and has developed gradually over a period of about 30 years. Also in Sao Paulo is the Cooperativa Central dos Cafecultores da Mogiana, a confederation of over 20 cooperatives of coffee growers, with a combined membership of about 7,000 (64).

In Peru, only 22 agricultural cooperatives with 2,184 members were reported in 1962. There were, however, about a half dozen agricultural societies which performed some activities often associated with cooperatives. These included the Asociacion de Agricultores de Canete and the Asociacion de Agricultores de Ica, each of which had an experiment station to study problems of importance to its members(68).

In Chile, there are a number of commodity cooperatives of which the milk producers' and wine makers' cooperatives are the most successful. In 1961, there were reported to be 163 cooperatives in Chile with 11,511 members. In addition, the Sociedad Nacional de Agricultura, representing large- and medium-sized farms, operated an experiment station, provided technical information, and sold equipment to its members (65).

In Colombia, there are semiofficial commodity organizations which perform some of the functions of cooperatives. The most important are Federacion Nacional de Cafeteros and Confederacion Colombiana de Ganaderos (cattle producers). There are similar organizations for cotton, rice, cereals, sugarcane, and bananas, plus some smaller ones (66).

In Central America, each government has an agency to supervise cooperatives. The number of cooperatives, however, is small with only about 70 active ones and a total membership of between 8,000 and 9,000 for the five countries (70).

Cooperatives are discussed so widely and with such enthusiasm in Latin America that a few words must be said concerning their nature and to point out some of their dangers. Some cooperatives have had outstanding success, but many more cooperative ventures have failed.

The original concept of agricultural cooperation was of a voluntary group of persons banded together to perform some economic function that they could do better as a group than as individuals. The cooperative is managed by officers chosen by its own members. Members are free to resign from the organization if they should decide to do so. The organization must sell the products of its members, but this is done in competition with private dealers. Its success, therefore, depends largely on the efficiency of its officers as managers of a commercial organization. It may, however, make contracts with its members requiring them to deliver to it all of their salable produce as long as they retain membership.

It is unfortunate that so many enthusiasts have forgotten this original concept. There are cases in which an effort has been made to establish a whole national system of cooperatives simply by passing a law. Laws or decrees have been proposed that would require all farmers or settlers in an area to join indicated cooperatives, and others by which cooperatives would be given monopoly powers over farm products sold from a given region, thus removing any stimulus from competition with commercial firms. One proposal has been that cooperatives be supported by a tax on all products sold from a certain region. Another is that members of cooperatives be granted preferential rates of import tariffs on equipment or supplies if made through a cooperative. This naturally would increase the membership of cooperatives coming under the provisions of the law. But the member who joined to obtain a tractor more cheaply would likely lose interest soon afterward in other aspects of cooperation.

The advocates of most of these proposals assume that the organization in question is to be directed by some government agency established for the purpose. Just how some of these proposals are to be of benefit to farmers is not apparent.

MEANS OF IMPROVING THE FARMER'S CONDITION

The farmer of Latin America has done well in providing increased per capita food and raw materials for the rapidly expanding population, despite his low income and the continuing hinderance to agricultural productivity by a number of serious socioeconomic barriers.

Farm methods, especially those on the smaller farms, have changed very little during the last few decades, and progressive overcrowding of the Andean region and of some other regions is making it more and more difficult for small-scale farmers to apply certain types of technological improvements. So far as the people on farms are concerned, three dominant conditions are affecting the speed and direction of progress: continued farm population growth; a rather clearcut stratification of rural population; and great deficiency in education of farm children.

Social and economic stratification into groups or classes is not confined to Latin America nor to people engaged in agriculture, but such stratification is quite apparent in Latin America and adds an element of rigidity to the rural economic structure which makes it more difficult for farm people to escape their unsatisfactory situation and find other employment.

Programs to Aid the Farmer

The stratification of farm population and the wide variation in agricultural situations from region to region mean that no single agricultural improvement program can be proposed for all farm people. Programs that would help one group or one country might be of little or no benefit elsewhere.

Agricultural development programs would need to include the following features: Employment or assistance, special training for excess farm population, education of farm people, improvement of farm technology, better use of land, improvements in marketing, provision of farm credit, strengthened prices of farm products, increased public revenue for support of the rural infrastructure, and further stimulation of industry to lower prices of farm supplies. The central and most difficult problem would be to find useful and remunerative work for the large and increasing number of farm people who have not been able to make a satisfactory living on farms and for the farm youth who have been rejected by agriculture and urban industry alike.

Employment or Assistance

Immediate measures need to be provided to offer employment or assistance for the excess farm population. Such help can be supplied by several temporary or short-term programs until more permanent or lasting solutions can take effect. The minifundistas and other low-income workers are in particular need of such help. If work cannot be found for them, there is a strong case for supplementary income payments. (This, of course, applies equally to disadvantaged groups in cities.) Some help may be afforded by Government-directed employment agencies which could, to some extent, guide the unemployed into opportunities for work.

Public Works.--Public works offer one means of helping needy farmworkers. In virtually every Latin American community there is a need for construction or repair work on public facilities. This may involve water systems, sewage, or marketing facilities. Such improvements usually call for high inputs of labor in comparison to capital. National and local authorities could work out means of mobilizing the unemployed or partially employed for work on such projects.

Special Training.--Many thousands of persons each year give up the struggle to earn a living in overcrowded farm areas and move into the cities. There they find themselves at the bottom of the scale as wage earners. Without special skills, without capital, and very often illiterate, they are forced to accept most lowly types of work at subsistence wage rates. The cities have little need for more workers of this type--but, at the same time, do need skilled workers. It should be possible to establish small trade schools, preferably in small towns or villages, where excess farmworkers could pause in their flight to urban life. These schools could give at least elementary training

in such activities as mechanical work, operation of tractors and trucks, and apprentice courses in carpentry, cabinet work, and bricklaying. For the women, training preparing them for jobs as clerks, secretaries, bookkeepers, seamstresses, or other skilled work might be developed.

Governments would, of course, need to subsidize such trainees for a few months while they are taking courses and while they are locating employment. Such training would certainly constitute a profitable investment for developing nations, in addition to providing the badly needed relief for the unemployed.

Education

In the long run, the most important program to increase the returns to farm people would be to provide universal education for farm children. Facility in reading and writing is just as important for farmers as for any other group, especially with the development of more sophisticated farm technology.

Primary Education.--Except in Argentina, Chile, Costa Rica, and Uruguay, very little provision is made for schools outside of towns or villages. This means that a farm boy or girl who lives too far from a village to walk to school each day is likely to receive very little schooling. How many farm children never start to school is not known.

In some countries, rural schools offer only three or four grades. Consequently, even if a child completes all the grades offered in the local school, he will probably not be qualified to advance to secondary school or to a university.

In Colombia, Guatemala, and Honduras, according to recent figures, even the fourth grade contained only from 1 to 4 percent of the pupils who had entered first grade. In Mexico, the figure was 8 percent, and in Venezuela, 15 percent.

So long as present rates of illiteracy or semiliteracy exist, it is fantasy to talk about modern agriculture for Latin America. Unless farmers have at least an elementary education, research and extension programs can have very little impact.

Both time and expense would be required for the needed improvement. If every country in Latin America started immediately on a sweeping program for rural education, it would be at least a decade before any appreciable impact would be felt at the level of practical farm operation. It would be even longer before a majority of farmers could be expected to read and write with facility. It would be nearly a decade, too, before any great increase in number of farm-bred children would be enrolled in the agricultural schools and colleges.

Nevertheless, a start should be made, and there is no program that will ultimately be more beneficial to farm people and to the Latin American countries.

In an expanded rural educational program, it would not be necessary that new schools be expensive structures. Some very good teaching has been done in inexpensive school houses. It would not be necessary that a program wait until a sufficient number of new teachers take courses in education in normal schools. Teachers who have completed sixth grade would be preferable to no teachers at all.

Strengthening Agricultural Colleges.--Agricultural colleges (facultades) in Latin America have to contend with inadequate budgets, low salaries of teachers, a high proportion of part-time teachers, lack of text material in some subjects, and inadequate provisions for postgraduate training. There is, in addition, neglect of some subjects (especially agricultural economics and domestic science).

A further difficulty is that the number of students and professors who have actually lived or worked on farms is extremely low--between 10 and 25 percent. Graduates of the agricultural colleges, their professors, and the men who have previously graduated from these institutions occupy positions in the ministries of agriculture, carry on research and extension work, and constitute the scientific and official elite of Latin

American agriculture. The fact that a majority of them have no farm background goes a long way toward explaining some of the shortcomings of the agriculture of the region and particularly the communication gap between agricultural officials and actual farmers.

One possible means of providing a farm background might be to require that each student spend some time living and working on a farm before he receives his degree from an agricultural college. Such a requirement has been applied successfully in various agricultural colleges of the United States. Where this was done, however, it was permitted that the year of practical experience could be divided into three or four periods to utilize summer vacations. To make the practical experience more attractive, if it were not actually required for a degree, a somewhat superior degree might be conferred upon students graduating with practical experience, and starting salaries for such graduates could be higher than for graduates without experience.

Other means of improving the agricultural colleges would be to continue to press for adequate operating budgets, more attractive salaries for professors, and a higher proportion of full-time professors.

In recent years, there has been some increase in appropriations for agricultural schools. Unfortunately, the increased funds have most often been used for new buildings or physical equipment. Improvements in such facilities are no doubt needed, but they are much less important from an educational point of view than improvements in the training of teachers and students.

Improvement of Technology

Technological developments or discoveries in agriculture are of only conversational interest until they are put into practice. For years, however, in Latin America, there has been more interest in research and extension institutions than in application of research findings or use of extension material. In only a few cases, such as with INTA in Argentina, have the administrative personnel of agricultural ministries spent any great amount of time consulting farmers who would be using research results or extension material. Although progress has been made on larger farms, most production increases have resulted from greater land inputs, with lesser amounts from mechanization, improved varieties and breeds, and herbicides and pesticides.

Research.--Many projects have dealt with use of fertilizers, but these have ordinarily been of a haphazard nature. Only in a very few cases have the fertilizer experiments been so designed that they would show the curves of diminishing rates of increase in physical yield which the farmer would need to use along with price data to decide whether to use a fertilizer and at what point to stop applying it so as to obtain maximum returns. There seem to be no experiments involving entire cropping systems designed to determine which combination of crops would yield maximum returns under a given set of conditions.

Determination of the optimum use of power equipment or animal power as compared with use of manpower is seldom made.

With the great importance of livestock in Latin America, especially of beef cattle, it might be expected that animal rations and means of maintaining gains on cattle through the dry season would be a high-priority subject. Again, the number of such studies is extremely small.

With the great amount of discussion of the growing scarcity of human food, it might be expected that many studies would be made of rural and urban diets, of utilization of indigenous foods, and of other aspects of domestic science. However, such studies are scarce, and have seldom been made by ministries of agriculture or agricultural experiment stations.

A large part of the reason for these research omissions comes from a lack of contact with farmers and from neglect to plan and orient research programs for maximum social and economic impact. Few research workers receive post-graduate training that fits them for effective work on the more complex practical problems. In addition, the low salaries paid research and extension workers lead to a rapid turnover of personnel.

Extension Work.--The purpose of the extension systems is to take to the farmer whatever available information and guidance he may want. It is a common complaint that the number of extension workers is inadequate and that budgets are too low to permit sufficient travel to visit farmers. These comments are undoubtedly true, and farmers would profit from more assistance from well-informed and well-organized extension services.

Part of the difficulty lies in the organization of the services themselves. In most Latin American countries, the prevailing monocultural outlook of agricultural administrators has led to such a fragmentation of extension services that a farmer may need to consult two or three extension agents in cases where one could give much better service. It is common to find separate services for crops and for livestock. For crops, there may be separate services for coffee, tobacco, cotton, cereals, and for various other crops. In some countries, much of the failure of extension service is related to the nonfarm origin of extension workers.

How far extension services have fallen short in producing an impact on farmers may be seen from the Central American study made by the Consejo Superior Universitario Centro Americana (CSUCA) which reported that the number of contacts of extension agents with farmers was equal to 15 percent of the number of farmers in Costa Rica, 5 percent in Guatemala, and about 4 percent in El Salvador and Honduras.

Studies in depth of the performance of extension agencies in various countries and of their actual accomplishment would be sure to benefit farmers and to pay good returns for the public funds involved.

Communication Between Farmers and Governments.--A critical defect in the official agricultural system is the lack of two-way communication between farmers and governments. In most countries, there are no effective farmers' organizations to argue their needs. Most of the existing organizations represent special groups, such as the large landowners, or else are commodity organizations that may be under the influence of commercial interests as much as of farmers.

It would be of material benefit both to the governments and to farmers if the agencies concerned were careful to consult representative groups of practical farmers both in planning programs and in putting them into effect. Such consultation down to the local level could be counted on to improve and to increase farmer participation. Incidentally, such counseling is being used to good effect by INTA in Argentina.

Better Use of Land

Forms of land tenure, size of farm, methods of land use, land conservation, settlement of unused lands, and related problems are widely discussed among farmers and among officials. Three of the most important topics of interest are land distribution, settlement of new lands, and cadastral surveys.

Land Distribution.--No subject related to Latin American agriculture has been discussed and argued more widely in recent years. It is clear, however, that there is no simple solution to the problem. There are areas and there are types of land that can best be utilized in large units or by extensive methods. There are many small holders who could not manage much larger holdings efficiently and economically.

Many large holdings, however, are not being managed economically and much of the land in them could provide a basis for efficient, medium-sized farms. The major

problem is not merely one of the size of farm units but the vastly more difficult one of finding economic employment for large numbers of farm laborers and minifundistas who are now living at a low level of subsistence in areas where the supply of land is altogether inadequate.

Several different types of attack might well be made on the problem simultaneously, with the programs modified to fit local conditions. In general, heavier land taxes graduated to higher rates against large holdings would likely accomplish a gradual reduction in size of the large, uneconomic units, although area per unit does not indicate the size of the farm business.

One important aspect of the problem is that of absentee ownership. In most cases, there is little justification for this type of tenure. It should be possible to develop legal and other means to discourage it.

For the benefit of farmers and society in general, it is essential that size of farm unit and use of land be very flexible. This is required by the widely varying characteristics of the land, by the differences in production requirements of the different farm products, and by the variations in managerial capacity of individual farmers.

Flexibility is required also by the development of new technology. Thus, cheaper mechanical power, cheaper means of weed control, changes in relative yields of individual crops, shifts in demand for labor by nonagricultural industries, and shifts of population among regions all call for readjustments in size and internal organizations of farms. With favorable price and taxation incentives, the automatic type of adjustments could probably modify the types and sizes of farm units more quickly and effectively than could the enactment of rigid legal limits.

Settlement of New Lands.--At present, new lands are often brought into use in a haphazard manner by settlement of squatters who take possession of small plots of unused jungle and gradually extend their holdings. Regularization of the status of these new settlers is one of the tasks now being undertaken in several countries. A second method of developing new lands is by sale by government or private owners to settlers or investors who usually develop larger and better organized units than do the squatters.

Many of the land-settlement projects now under government direction have been in the nature of demonstrations related to particular crops or livestock enterprises rather than of seeking a means for helping hard-pressed families to make a living. Consequently, they have often included unnecessarily expensive facilities which were not greatly needed by pioneering farm families.

Provision of a reasonable amount of capital for use by settlers during their first year is, of course, essential to a successful program. The sums do not need to be so great, however, as have been incurred in many of the present projects. Estimates by the writer of this report of minimum capital requirements per family during the first 10 years for settlers on 20 hectare lots in eastern Paraguay amounted to around \$2,000 per family. Thousands of squatters along the fringes of settlements in Latin America have started out with very little capital and have faced a hard life to gain subsistence for themselves and to build up small estates for their children.

Well-chosen public facilities would, however, make the lives of the settlers much easier and would materially increase their productivity. But considering the limited resources of the governments of the region, not too much should be expected in the form of public contributions.

A sensible program for settlement of new lands might be somewhat as follows:

1. To regularize the status of families now living as squatters.
2. To make at least a reconnaissance survey as soon as possible of available, unsettled lands so that settlers can be guided into suitable areas and kept away from lands not suitable to agriculture.

3. To see that the surveys provide an orderly pattern of plots large enough for viable farms with clearly marked boundaries so that conflicting property claims will be avoided in the future.

4. To provide roads and encourage the settlers to keep them in repair.

5. To provide for schools as soon as possible after settlement.

6. To provide at least a minimum of other public facilities including medical posts and a few demonstration fields for the use of extension agents.

7. During the first few years after settlement, to make available sufficient capital for purchase of foods that cannot be produced on the farm and for seeds, handtools, and a limited amount of livestock and equipment.

Cadastral Surveys.--Clear definition of farm boundaries and reasonable assessment of property values for tax purposes are essential to orderly development. Farmers are not likely to make substantial investments in improvements if they fear that they may lose their land because of uncertainty regarding land titles.

Improvements in Marketing

Inefficient marketing methods cause heavy losses in Latin America, and a large part of these losses fall on farmers, especially on producers of perishable products for local consumption. Several programs have been proposed to improve marketing. Some of the losses are caused by bad roads which prevent farmers from getting their products to market. These losses will be reduced only slowly as farm roads are improved. Other losses result from lack of market information, shortages of facilities, and undesirable practices by some buyers and sellers of farm produce.

As population grows, it becomes necessary to expand marketing facilities and to establish closer control over the marketing process. Most governments are engaged in building some facilities such as warehouses, silos for grain, cold storage plants, meat packing plants, and others. For maximum economy and highest returns to farmers, it would be well if a thorough study were made of the needs for such facilities and of the possibility of private construction before expensive programs are launched at government expense. Some programs have been well-justified, but others have resulted in heavy losses.

Increased extension work concerning marketing would help farmers grade and prepare their products for sale. In addition, all farmers need accurate and up-to-the minute market news services so they will know what prices are actually being paid and where they can sell for maximum profit.

There has been great enthusiasm among public officials and some farmers for cooperative marketing associations. Governments could perform a valuable service to farmers by disseminating information on the nature of cooperatives and on some of their pitfalls. It would also help if frequent inspections were made of activities of existing cooperatives and if publicity were given to their operations, especially to their financial status.

Provision of Farm Credit

The supply of credit is closely related to taxation and other fiscal measures of governments. Also related are measures to control or guarantee prices.

Since the governments are not able to finance any large sectors of their national economies, their appropriations for farm credit must be viewed largely as gestures made in the hope that they will relieve some of the most urgent needs and demonstrate that the governments have at least good will toward the farmers. Accomplishment of this objective is strengthened by the fact that government loans are commonly made at subsidized interest rates.

There are, however, some undesirable side effects. For one thing, subsidized farm interest rates discourage commercial banking agencies from establishing more extensive commercial agencies for farm credit. In addition, they lead to a maldistribution of capital. The fact that some funds are being loaned at 10 percent, for example, might mean a loss of investments where funds could have yielded 15 percent or more. Studies are needed to determine the rates that varying amounts of capital can earn in agriculture. Under what terms can farmers repay the loans, and what safeguards are needed by the lenders? How can the process of obtaining a farm loan be simplified so that the farmer may be spared the time and expense now involved? Most of the present farm loans are for short-term production purposes. Funds for purchase of land are virtually nonexistent in most countries.

There are thousands of young men who want to obtain land each year, and corresponding numbers of older farmers who need to sell their land for one reason or another. Serious thought should be given to the problem of how to get these two groups together. Possibly, payment for land purchases in terms of amounts of crops might be developed to a greater degree than now practiced.

Strengthening Prices of Farm Products

Price controls and guarantees are demanded by farmers as well as by other groups. Such controls have more often been applied in the interest of consumers rather than of farmers. Urban population and the influence of urban groups are continually increasing, thus reducing the probability that price controls will actually be exercised in the interests of the farmer. The cases where farmers have actually received such benefits have usually been related to deficit production of specific products, such as wheat in Brazil.

Price guarantees are not likely to be effective, either, in countries where there is a pronounced rate of inflation. With the general price level rising 20 to 30 percent each year any moderate price guarantee is soon superseded by the rise of the general price level. One further reason why farmers cannot expect too much is that Latin American governments are nearly always too short of funds to make good on any very large guarantees. This does not mean that farmers should not obtain such benefits as they can.

Increased Public Revenue for Support of the Rural Infrastructure

If schools, public roads, and other facilities are to be provided, governments must obtain greater revenue. This means higher tax rates, especially on land and on incomes. In several countries, progress is already being made in this direction. The funds required are large, however, and farmers as well as urban people will need to contribute.

Higher land taxes are not without some incidental benefits. For one thing, they imply lower net rents; and these mean lower sale prices for land. This, in turn, makes it easier for young farmers to obtain land. Furthermore, the greater government revenue should assist in controlling inflation and strengthening the credit system. Increased taxes, however, are no more popular in Latin America than they are elsewhere. Hence, progress in this direction is likely to be slow.

Further Stimulation of Industry

All governments in Latin America are committed to a policy of industrialization. It has been shown that this has often been carried out in ways that are to the disadvantage of agriculture. Nevertheless, it would be advantageous to farmers if industry

were expanded even further. It has been the methods adopted to stimulate industry rather than the actual expansion that has been undesirable. The granting of virtual monopoly in some industries and development of oligopoly in others have, it is true, raised industrial profits and made the establishment of some new factories attractive to investors. But this places a limitation on the size to which the respective industries can grow, and burdens farmers and others with unnecessarily high prices.

The high prices limit sales and consumption of the industrial products. Limited production lowers the demand for industrial workers. This, in turn, reduces opportunity for employment of redundant farm workers. A policy to encourage the production of greater industrial volume at lower prices would be highly beneficial both to farmers who buy the products and to farm migrants looking for work.

Prospects for Latin American Farmers

How will farmers' problems affect future agricultural prospects? Will the disadvantages under which the farmer labors soon diminish or disappear? Are governments taking remedial actions that will place farm people on a par economically with urban population?

Some disadvantages might be remedied rather easily and others with much difficulty. It is important to note, however, that there are methods by which each could be mitigated or remedied if the farmers understood them and if the governments were willing to take the actions required.

Future prospects are affected by a large number of factors, some favorable and some unfavorable. To farmers, the most favorable factor is probably the outlook for continued growth of population and income with the consequent increase in demand for food and other farm products. Continued development of more efficient technology is also a favorable factor, as is the availability of new lands for settlement. However, farm laborers and small tenants and operators may reap few benefits.

Adoption of herbicides and pesticides has been rapid, since these are relatively easy to use. But there has been some delay because of high prices caused by protectionism and high transportation and handling costs.

Efforts on research and extension work in livestock management have not been so great as with crops. There are still many opportunities for improvement, and progress may be more rapid in the future.

Improved motive power and implements are being adopted rapidly in some areas. But use of these is mainly restricted to larger farms and to land that is smooth enough to permit the use of heavy machinery. In most countries, adoption is held back by import tariffs on the implements and by high profit margins charged by the dealers.

Favorable to agriculture is the fact that there are new lands to be settled. All but three or four of the Latin American countries still have substantial areas that can be cleared and opened up to settlement. These offer a great opportunity for the future for new farmers and for the expansion of production of foods and raw materials.

What of the speed that can be expected for agricultural development? Are the barriers to progress likely to be swept away in 5 years, 10, or in 20? In the past, Latin American governments have moved slowly in changing laws and regulations affecting farmers. It would be unrealistic to expect that they would now suddenly change their pace and accomplish in 5 years as much as they previously have in 20.

More than this, as urban population grows and the proportion of people living on the land declines, the political position of the farmer will become weaker. Thus, the twin tendencies of population growth and urbanization are sure to strengthen the urban groups whose influence has brought many of the farmers' difficulties into existence. Strong farmers' organizations might help offset this urban influence, but they do not seem to be developing at this time.

There are some important factors influencing farmers' welfare that cannot be changed quickly no matter how strong may be the demand. Most important of these is the education of farm youth.

There are many opportunities for the development of a more prosperous agricultural sector in Latin America with better living conditions than those farmers are now able to enjoy. Delaying such development, however, are some very serious barriers which must be overcome, including lack of education, lack of rural roads, poorly organized research and extension service in some countries, widespread absentee ownership of land, and price-making policies and practices that place the farmers at a disadvantage. Some of these barriers are, no doubt, being weakened. But most of them will require many years to overcome, and the amount of time will vary among different regions. It is certain that there will be progress, but most of it will be slow.

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APPENDIX TABLES

Table 1.--Latin America: Indices of total and per capita crop, livestock, food and agricultural production, 1964-66
(1954-56=100)

Country or group	Production				Per capita production			
	Crop	Livestock products	Food	Total	Crop	Livestock products	Food	Total
	-----Index-----							
Argentina.....	124	102	115	114	105	86	97	96
Bolivia.....	145	137	140	139	116	110	112	112
Brazil.....	145	138	150	144	108	102	111	107
Chile.....	129	108	120	116	101	85	94	91
Colombia.....	135	135	134	135	101	101	101	101
Costa Rica.....	167	92	125	145	115	64	86	100
Dominican Republic.....	116	121	118	119	81	85	83	84
Ecuador.....	128	182	124	131	93	132	90	95
El Salvador.....	154	111	127	143	113	82	93	105
Guatemala.....	197	128	161	189	142	92	116	137
Haiti.....	94	75	84	91	75	60	67	73
Honduras.....	168	128	154	161	123	94	113	118
Mexico.....	164	139	165	158	118	100	119	114
Nicaragua.....	193	126	129	156	143	93	95	115
Panama.....	140	180	146	145	103	133	108	107
Paraguay.....	139	110	127	132	109	86	99	103
Peru.....	137	140	133	137	103	106	100	103
Uruguay.....	91	115	110	108	79	100	96	94
Venezuela.....	154	200	185	171	107	139	128	119
19 republics.....	144	126	140	139	108	95	105	104
Cuba.....	93	87	94	91	75	70	76	73
Guyana.....	152	200	150	155	114	150	113	117
Jamaica.....	136	130	133	135	113	108	111	112
Trinidad and Tobago.....	112	167	118	121	83	124	87	89
23 republics.....	141	124	137	136	106	93	103	102

Sources: (90), (95) and (96).

Table 2.--Latin America: Rate of growth of population, agricultural and nonagricultural sectors, and gross domestic product, 1950-52 through 1963-65

Country or group	Population	Agricultural sector	Other sectors	Gross domestic product
	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Argentina.....	1.8	1.9	2.9	2.7
Bolivia.....	2.1	1.2	1.4	1.4
Brazil.....	3.0	4.8	5.5	5.3
Chile.....	2.5	3.2	3.8	3.8
Colombia.....	2.8	3.1	5.5	4.6
Costa Rica.....	4.1	2.8	7.0	5.5
Ecuador.....	3.2	3.9	5.0	4.6
El Salvador.....	3.1	3.4	6.4	5.4
Guatemala.....	2.9	3.7	5.1	4.6
Haiti.....	2.1	1.2	2.3	1.7
Honduras.....	3.3	3.3	4.6	3.9
Mexico.....	3.2	4.2	6.4	6.0
Nicaragua.....	3.4	4.6	6.8	5.9
Panama.....	3.0	3.9	6.4	5.8
Paraguay.....	2.4	2.5	3.2	2.9
Peru.....	2.6	4.0	5.7	5.3
Uruguay.....	1.2	0.5	1.3	1.2
Venezuela.....	3.8	5.7	6.0	6.0
18 republics.....	2.8	3.6	4.9	4.6

Source: (92).

Table 3.--Latin America: Population and rates of growth, selected years and periods
1950-65

Country or group	Population				Rate of increase		
	1950	1955	1960	1965	1950-54	1955-59	1960-64
	<u>Millions</u>	<u>Millions</u>	<u>Millions</u>	<u>Millions</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Argentina.....	17.2	19.1	21.0	22.9	2.2	1.9	1.6
Bolivia.....	3.0	3.3	3.7	4.1	2.0	2.1	2.3
Brazil.....	52.2	60.5	70.3	81.3	2.9	3.1	3.0
Chile.....	6.1	6.8	7.6	8.6	2.3	2.6	2.4
Colombia.....	11.7	13.4	15.5	17.8	2.9	2.9	2.9
Costa Rica.....	.8	1.0	1.2	1.5	3.7	3.7	3.8
Dominican Republic....	2.2	2.6	3.0	3.6	3.6	3.6	3.6
Ecuador.....	3.2	3.7	4.3	5.0	2.8	3.3	3.2
El Salvador.....	1.9	2.1	2.5	2.9	2.5	3.3	2.9
Guatemala.....	2.8	3.3	3.8	4.3	3.3	3.3	3.3
Haiti.....	3.4	3.7	4.1	4.7	1.9	2.2	2.3
Honduras.....	1.4	1.7	1.9	2.3	3.0	3.2	3.1
Mexico.....	26.4	30.6	36.0	42.7	3.1	3.2	3.4
Nicaragua.....	1.1	1.2	1.5	1.7	3.0	2.9	3.1
Panama.....	.8	.9	1.1	1.2	2.9	2.9	2.8
Paraguay.....	1.4	1.6	1.8	2.0	2.3	2.4	2.5
Peru.....	8.0	8.8	10.0	11.6	1.9	2.5	3.0
Uruguay.....	2.2	2.3	2.5	2.7	1.4	1.4	1.4
Venezuela.....	5.0	6.0	7.3	8.7	3.7	4.2	3.4
19 republics.....	150.8	172.7	199.3	229.6	2.8	2.9	2.9
Cuba.....	5.5	6.1	6.8	7.6	2.2	2.1	2.1
Guyana.....	.4	.5	.6	.6	2.7	3.0	2.7
Jamaica.....	1.4	1.5	1.6	1.8	1.6	1.7	1.7
Trinidad and Tobago...	.6	.7	.8	1.0	3.1	3.2	3.0
23 republics.....	158.7	181.6	209.1	240.5	2.7	2.7	2.9

Source (92)

Table 4.--Latin America: Rural, urban, and total population and trends, 1950-65¹

Country or group	Population						Urban share		Population increase					
	1950			1965			1950	1965	Number			Rate		
									1950-65			1950-65		
	Rural	Urban	Total	Rural	Urban	Total			Rural	Urban	Total	Rural	Urban	Total
	Mil- lions	Mil- lions	Mil- lions	Mil- lions	Mil- lions	Mil- lions	Per- cent	Per- cent	Mil- lions	Mil- lions	Mil- lions	Per- cent	Per- cent	Per- cent
Argentina.....	6.2	11.0	17.2	7.1	15.8	22.9	64.2	68.8	0.9	4.8	5.7	1.0	2.4	2.0
Bolivia.....	2.2	.8	3.0	2.8	1.3	4.1	25.8	32.5	0.6	0.5	1.1	1.6	3.3	2.1
Brazil.....	36.1	16.1	52.2	45.3	36.0	81.3	30.8	44.3	9.2	19.9	29.1	1.5	5.5	3.0
Chile.....	2.8	3.3	6.1	2.8	5.8	8.6	54.8	67.6	0	2.5	2.5	0	3.8	2.3
Colombia.....	7.4	4.3	11.7	8.8	9.0	17.8	36.4	50.4	1.4	4.7	6.1	1.2	5.1	2.8
Costa Rica.....	.6	.2	.8	1.0	.5	1.5	29.9	33.7	0.4	0.3	0.7	3.5	6.3	4.3
Dominican Republic.....	1.7	.5	2.2	2.5	1.1	3.6	21.5	30.5	0.8	0.6	1.4	2.6	5.4	3.3
Ecuador.....	2.3	.9	3.2	3.2	1.8	5.0	27.5	35.8	0.9	0.9	1.8	2.4	4.7	3.0
El Salvador.....	1.4	.5	1.9	2.0	.9	2.9	27.6	30.6	0.6	0.4	1.0	2.4	4.0	2.9
Guatemala.....	2.1	.7	2.8	2.9	1.4	4.3	24.0	32.3	0.8	0.7	1.5	2.2	4.7	2.9
Haiti.....	3.0	.4	3.4	4.0	.7	4.7	10.1	14.7	1.0	0.3	1.3	1.9	3.8	2.2
Honduras.....	1.2	.2	1.4	1.7	.6	2.3	17.3	25.6	0.5	0.4	0.9	2.5	7.6	3.4
Mexico.....	14.2	12.2	26.4	17.4	25.3	42.7	46.1	59.2	3.2	13.1	16.3	1.4	5.0	3.3
Nicaragua.....	.8	.3	1.1	1.1	.6	1.7	28.0	36.4	0.3	0.3	0.6	2.1	4.7	2.9
Panama.....	.5	.3	.8	.7	.5	1.2	35.4	45.3	0.2	0.2	0.4	2.3	3.5	2.7
Paraguay.....	1.0	.4	1.4	1.4	.6	2.0	28.1	29.0	0.4	0.2	0.6	2.3	2.7	2.4
Peru.....	5.5	2.5	8.0	6.6	6.0	11.6	31.3	43.1	1.1	2.5	3.6	1.2	4.7	2.5
Uruguay.....	.5	1.7	2.2	.5	2.2	2.7	79.0	82.6	0	2.5	0.5	0	1.7	1.4
Venezuela.....	2.6	2.4	5.0	2.9	5.8	8.7	48.7	67.0	0.3	3.4	3.7	0.7	6.1	3.8
19 republics.....	92.1	58.7	150.8	114.7	114.9	229.6	38.9	50.0	22.6	56.2	78.8	1.5	4.6	2.8
Cuba.....	2.8	2.7	5.5	3.1	4.4	7.6	50.0	58.8	0.3	1.7	2.0	0.7	3.3	2.1
Guyana.....	.4	(2)	.4	.5	.1	.6	12.0	16.0	0.1	0.1	0.2	1.5	5.4	2.7
Jamaica.....	1.1	.3	1.4	1.4	.4	1.8	21.4	24.0	0.3	0.1	0.4	1.6	1.9	1.7
Trinidad and Tobago.....	.5	.1	.6	.8	.2	1.0	16.7	23.0	0.3	0.1	0.4	3.2	4.7	3.5
23 republics.....	96.9	61.8	158.7	120.5	120.0	240.5	38.9	49.9	23.6	58.2	81.8	1.5	4.6	2.8

¹ Total population estimates vary slightly from table 3 due to unadjusted data. ² Less than 50,000.

Sources: (60) and (97).

Table 5.--Latin America: Persons economically active, total and employed in agriculture, selected census years

Country or group and census year	Total	Persons in agriculture, forestry, hunting, and fishing						
		Number			Percentage or employed population			
		Total	Men	Women	Men and women	Men	Women	
		<u>Thou- sands</u>	<u>Thou- sands</u>	<u>Thou- sands</u>	<u>Thou- sands</u>	<u>Per- cent</u>	<u>Per- cent</u>	<u>Per- cent</u>
Argentina ¹ --1960.....	7,599	1,461	1,345	116	19.2	22.8	6.8	
Bolivia--1950.....	1,361	974	534	440	71.6	68.4	75.7	
Brazil ¹ --1960.....	22,651	11,698	10,523	1,175	51.6	56.6	29.0	
Colombia--1951.....	3,756	2,023	1,930	93	53.9	63.2	13.3	
Costa Rica--1963.....	395	194	191	4	49.2	57.7	5.4	
Chile ¹ --1960.....	2,356	648	626	22	27.5	34.1	4.3	
Dominican Republic ¹ --1960....	821	504	495	9	61.4	67.6	10.0	
Ecuador--1962.....	1,443	802	762	40	55.6	63.1	16.9	
El Salvador--1961.....	807	486	472	15	60.2	71.1	10.2	
Guatemala ¹ --1964.....	1,317	861	841	20	65.4	73.1	12.2	
Haiti--1950.....	1,747	1,454	771	683	83.2	86.8	79.7	
Honduras--1961.....	568	379	375	4	66.7	75.9	4.9	
Mexico--1960.....	11,332	6,144	5,480	664	54.2	58.9	32.6	
Nicaragua ¹ --1963.....	477	283	269	14	59.4	70.7	14.9	
Panama ² --1960.....	337	156	151	5	46.2	56.9	6.8	
Paraguay--1962.....	616	322	291	31	52.2	61.3	21.8	
Peru--1961.....	3,125	1,556	1,340	215	49.8	54.8	31.7	
Uruguay--1963.....	1,016	182	175	7	17.9	23.0	2.8	
Venezuela--1961.....	2,351	760	733	26	32.3	38.0	6.3	
19 republics.....	64,075	30,887	27,304	3,583	48.2	42.6	5.6	
Cuba--1953.....	1,972	819	804	15	41.5	46.9	5.7	

¹ Data obtained from a sample of the census returns. ² Excludes indigenous population of 62,187 persons.

Source: (60) pp. 109-117.

Table 6.--Peru: Net family income

Farm size and area	Case studies	Average area farmed	Family income			Size range
			Net from farm	Off farm	Total	
	<u>Number</u>	<u>Hectares</u>	<u>Dollars</u>	<u>Dollars</u>	<u>Dollars</u>	<u>Hectares</u>
Large multifamily farm:						
Coast.....	18	243	33,850	(¹)	(¹)	Over 50
Sierra.....	12	7,018	17,125	(¹)	(¹)	Over 100; pasture 2,500
Selva.....	10	188	10,125	(¹)	(¹)	High selva--over 100; low selva--over 200
Medium-sized, multifamily farm:						
Coast.....	12	24	2,710	(¹)	(¹)	10-50
Sierra.....	10	83	3,230	(¹)	(¹)	Irrigated--10-100; dry--50-100
Selva.....	2	72	3,610	(¹)	(¹)	High selva--20-100; low selva--100-200
Family farm:						
Coast.....	20	5.8	807	63	870	3-10
Sierra.....	14	15.7	547	189	736	Irrigated--3-10; dry--10-50
Selva.....	13	15.3	1,027	187	1,214	High selva 10-20; low selva 20-100
Subfamily farm:						
Coast.....	20	1.8	342	187	529	Up to 3
Sierra.....	38	2.5	172	97	269	Irrigated--up to 3; dry--up to 10
Selva.....	13	3.6	322	121	443	High selva--up to 10; low selva--up to 20

¹ Not available

Source: (74) pp. 139, 220, 266, 268, 270, 274.

Table 7.--Latin America: Pupils in primary schools, by grades, during 6-year primary cycle¹

Country and years ²	Percentages of first grade at beginning of period					
	First grade	Second grade	Third grade	Fourth grade	Fifth grade	Sixth grade
	-----Percent-----					
Panama--1959-64.....	100	79	66	58	52	46
Uruguay ³ --1957-62.....	100	78	71	62	52	40
Costa Rica--1959-64.....	100	78	65	54	44	37
Argentina--1955-61.....	100	63	56	48	42	36
Chile ⁴ --1957-62.....	100	66	58	49	39	33
Venezuela--1959-64.....	100	60	52	42	34	28
Mexico--1959-64.....	100	60	47	35	31	27
Ecuador--1960-65.....	100	58	49	39	31	27
El Salvador--1960-65.....	100	57	41	31	26	22
Colombia--1959-63.....	100	62	33	24	20	--
Paraguay--1960-65.....	100	63	46	32	24	18
Honduras--1959-64.....	100	50	34	22	18	15
Guatemala--1959-64.....	100	40	27	20	16	14
Haiti--1957-62.....	100	108	39	29	21	14
Nicaragua--1957-62.....	100	22	21	14	12	11
Dominican Republic--1960-65.....	100	31	28	17	11	9
Brazil ⁵ --1963.....	100	42	29	20	7	1
Bolivia, urban schools--1960-65.....	100	79	76	67	58	46

¹ Years given are the most recent for which data were available.

² Years covering a cycle of grades at the primary level, usually 6 years.

For example, for Panama, 1959 relates to the first year and 1964 to the sixth year of the 6-year cycle, and the number of pupils in sixth grade in 1964 was 46 percent as great as the number in first grade in 1959.

³ Public schools only.

⁴ Excludes pupils in vocational schools.

⁵ Data refer to 1963 actual enrollment in each grade.

Source: (61).

Table 8.--Latin America: Size of farms, total number, and distribution

Country and census year	Number of farms	Percentage of farms by size groups ¹								
		Under 5 ha.	5 to 10 ha.	10 to 20 ha.	20 to 50 ha.	50 to 100 ha.	100 to 200 ha.	200 to 500 ha.	500 ha. or more	
		Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
	Thousands	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
Argentina--1960.....	457	15.7	2 23.9	--	3 27.8	--	12.9	4 8.4	11.3	
Brazil--1960.....	3,342	44.9	--	--	44.7	--	10.4	--	--	
Colombia--1960.....	1,210	62.5	14.0	9.4	7.2	3.3	1.8	1.1	0.7	
Chile--1965.....	259	49.1	13.0	11.8	11.5	5.6	3.6	2.8	2.6	
Costa Rica--1963.....	65	36.0	16.8	14.2	22.7	3.9	2.9	2.3	1.6	
Cuba--1952.....	101	13.9	12.4	5 29.8	20.2	11.2	6 10.1	7 1.6	0.9	
Dominican Rep.--1960.....	450	86.3	7.6	3.4	1.8	0.6	0.2	0.1	--	
Ecuador--1954.....	344	73.1	10.5	6.2	5.6	2.4	1.0	0.7	0.4	
El Salvador--1961.....	224	85.1	6.1	3.9	2.9	1.1	0.5	0.3	0.1	
Honduras--1952.....	156	57.0	18.0	11.9	8.8	2.5	1.0	0.5	0.3	
Mexico (non-ejido)--1960.....	1,365	65.0	6.9	5 9.7	5.1	4.3	3.1	2.2	3.7	
Panama--1961.....	96	45.8	18.9	15.6	12.6	4.5	1.6	0.7	0.2	
Paraguay--1961.....	150	46.5	23.4	16.4	8.5	1.9	1.1	0.8	1.4	
Peru--1961.....	852	83.1	9.0	3.6	2.1	0.9	0.5	0.4	0.4	
Uruguay--1961.....	87	15.0	15.0	16.1	18.0	10.8	8.5	8.0	9.0	

¹ Only those countries are listed for which comparable information was available. Blank spaces in certain columns indicate a lack of comparable information.

² Up to 25 hectares.

³ 25 to 100 hectares.

⁴ 200 to 400 hectares.

⁵ Over 10 and under 25 hectares.

⁶ Over 100 and under 500 hectares.

⁷ Over 500 and under 1,000 hectares.

Source: (59).

Table 9.--Latin America: Land in farms of over 500 hectares¹

Country and census year	Total number of farms	Area in farms	Farms over 500 ha.	Total area in farms over 500 ha.	Percentage of farms over 500 ha.	Percentage of area in farms over 500 ha.
	Thousands	1,000 ha.	Number	1,000 ha.	Percent	Percent
Argentina--1960.....	457	175,142	² 50,234	145,975	9.2	² 82.8
Brazil--1960.....	3,342	265,451	³ 32,885	125,539	1.0	³ 47.3
Colombia--1960.....	1,210	27,338	6,902	11,052	0.8	40.4
Costa Rica--1963.....	65	2,671	419	833	0.7	31.2
Chile--1955.....	151	27,712	6,326	22,398	4.2	80.8
Ecuador--1954.....	344	6,000	1,369	2,707	0.4	45.1
El Salvador--1961.....	224	1,561	313	375	0.2	24.0
Honduras--1952.....	156	2,507	478	709	0.3	28.3
Mexico (non-ejido)--1960.....	1,365	169,084	37,392	142,976	2.7	83.5
Panama--1961.....	96	1,806	224	371	0.2	20.5
Paraguay--1956.....	150	16,817	2,138	14,983	1.5	88.7
Peru--1961.....	852	18,605	3,792	14,066	0.5	75.6
Uruguay--1961.....	87	16,988	7,521	12,283	0.9	72.3

¹ Only those countries are listed for which comparable information was available.² Farms of over 400 hectares.³ Farms of over 1,000 hectares.

Source: (58).

Table 10.---Wholesale commodity price index trends, United States and selected Latin American countries, 1930-67
(1958 = 100)

Year	United States	Ecuador	Venezuela	Mexico	Peru	Costa Rica	Dominican Republic	Paraguay	Chile	Argentina	Brazil	Colombia	Guatemala	El Salvador
1930	48	--	72	15	6.8	--	--	--	0.5	--	--	--	--	--
1931	41	--	69	14	6.8	--	--	--	0.5	--	--	--	--	--
1932	35	--	64	13	6.8	--	--	--	0.8	--	--	--	--	--
1933	36	--	58	13	7.5	--	--	--	1.0	--	--	--	--	--
1934	42	--	55	14	7.5	--	--	--	1.0	--	--	--	--	--
1935	44	--	51	14	7.5	--	--	--	1.0	--	--	--	--	--
1936	44	--	55	15	7.5	40	--	--	1.1	--	--	--	--	--
1937	47	--	60	17	8.2	42	--	--	1.4	--	6.0	--	--	--
1938	43	--	58	18	8.8	41	--	1.2	1.4	--	5.6	--	--	--
1939	43	--	58	18	8.8	42	--	1.2	1.3	--	5.6	--	--	--
1940	44	--	56	18	9.5	40	--	1.6	1.5	--	6.0	--	--	--
1941	48	21	60	20	12.0	43	36	1.2	1.6	--	7.5	--	--	--
1942	54	33	67	22	16.0	55	45	2.0	2.2	--	8.2	--	--	--
1943	56	41	74	26	17.0	69	60	2.0	2.5	--	10.0	--	--	--
1944	56	38	76	32	18.0	72	74	2.4	2.6	--	16	--	--	--
1945	57	36	77	36	19	79	74	2.8	2.7	--	18	--	--	--
1946	66	47	78	41	20	79	85	3.2	3.0	--	21	--	81	--
1947	81	54	89	44	24	92	103	4.0	4.0	--	22	--	88	--
1948	88	54	100	46	31	94	103	4.8	4.6	--	24	--	93	--
1949	83	63	94	51	44	93	88	5.6	5.3	--	26	--	95	--
1950	87	76	94	56	51	105	85	7.1	6.2	--	30	51	99	--
1951	96	94	100	69	61	107	95	11.0	8.1	--	36	55	106	--
1952	94	97	101	72	66	97	97	24	10.0	--	39	54	103	--
1953	92	100	98	70	68	93	97	40	12.3	--	45	58	104	--
1954	92	99	101	77	76	96	91	48	19.0	--	59	62	113	--
1955	93	98	101	88	82	99	93	57	34	--	66	63	100	110
1956	96	97	98	92	94	100	92	76	56	61	79	69	100	110
1957	99	100	99	96	96	100	101	93	80	76	89	85	99	106
1958	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1959	100	99	103	101	123	99	94	118	130	233	138	110	101	94
1960	100	97	103	106	145	101	97	133	137	270	181	114	99	94
1961	100	102	105	107	145	105	91	150	138	292	250	122	98	92
1962	100	103	110	109	147	104	100	157	149	381	383	125	100	91
1963	100	107	114	110	159	108	107	161	229	491	664	158	99	93
1964	100	110	118	114	--	107	105	167	345	619	1,273	185	103	99
1965	102	112	122	117	--	104	117	182	429	767	1,925	201	101	97
1966	105	115	124	118	--	106	111	--	527	920	2,619	235	103	100
1967	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sources: (87, 88, and 91).

Table 11.--Dollar equivalents of farm credit in the United States and selected Latin American countries for the periods indicated (approximate values)

Country and year	Issued in year or outstanding	Credit agencies	Credit	
			Per farm	Per hectare cropland
			<u>Dollars</u>	<u>Dollars</u>
United States:				
1958.....	Outstanding	Mortgage debt--all agencies	2,950.00	68.50
1958.....	Outstanding	Non-real estate debt--all agencies	2,730.00	62.25
1965.....	Outstanding	Mortgage debt--all agencies	6,048.00	130.75
1965.....	Outstanding	Non-real estate debt--all agencies	5,422.00	117.25
Countries with low inflation:				
Venezuela--1961...	Loans granted	Government and commercial agencies	155.00	20.00
Guatemala--1964...	Loans granted	Government agencies	139.00	27.33
El Salvador--1964..	Loans granted	Government agencies	225.00	77.00
Honduras--1964....	Loans granted	Development Bank and commercial banks	100.00	16.00
Costa Rica--1964..	Outstanding	National banking system	1,410.00	149.50
Nicaragua--1964...	Outstanding	Government agencies and commercial banks	640.00	45.00
Countries with moderate inflation:				
Colombia--1964....	Outstanding	Government agencies and commercial banks	210.00	55.00
Peru--1962-63.....	Outstanding	Government development bank	69.00	26.50
Mexico				
1960.....	Outstanding	Banco Ejidal--to ejiditarios	65.00	10.50
1963.....	Outstanding	Government agencies and commercial banks	185.00	18.20
Countries with rapid inflation:				
Argentina--1963...	Outstanding	Government and other banks	780.00	18.40
Brazil--1965.....	Outstanding	Government and other banks	180.00	29.00
Chile--1963.....	Outstanding	Government agencies	300.00	21.00

Source: Unpublished data.

Table 12.--Prices of farm equipment in the United States and selected Latin American countries, recent years

Items	United States 1964	Argentina 1964-65	Brazil 1966	Chile 1963	Paraguay 1966
----- Dollars -----					
Tractors:					
25-29 h.p.....	2,720	4,110	--	--	3,522
30-50 h.p.....	3,470	5,220	4,960	4,930	--
50-59 h.p.....	5,770	7,750	5,280	--	--
Tractor equipment:					
Plow, moldboard, 2-bottom.....	328	314	--	--	--
Disk, 3-disk.....	508	396	340	719	640
Disk harrow, 18 to 20-disk.....	308	712	272	986	607
Cultivator.....	360	--	--	--	417
Grain combine.....	¹ 7,230	² 8,240	--	³ 15,158	⁴ 7,543
Horse-drawn equipment:					
Plow, 1-bottom.....	--	--	25.50	--	47.60
Disk.....	--	--	--	--	112.30
Harrow, spike.....	--	--	22.50	22.00	19.00
Cultivator, 5-shovel.....	--	--	15.60	40.00	17.90
Planter, 1-row.....	--	--	46.35	--	59.50
Work horse.....	--	26.00	86.00	--	32.00
Ox.....	--	--	64.00	--	57.00
Barbed wire, 50 km.....	10.70	--	15.00	15.50	15.00
Tractor fuel:					
Liter.....	.043	.055	.066	--	--
Gallon.....	.163	.208	.250	--	--

¹ 12-ft. combine, United States.

² 12-ft. combine, Argentina.

³ 8.5-ft. combine, Chile:

⁴ 7-ft. combine, Paraguay.

Source: (Unpublished data).

Table 13.--Brazil's costs of fertilizers per ton to Sao Paulo farmers compared with costs of fertilizer to farmers in the United States, 1965

Item	Phosphate rock from Pernambuco	Muriate of potash from Canada
	- - - - - <u>Dollars</u> - - - - -	
Mining, grinding, hauling.....	5.90	--
Overhead, misc. charges, taxes.....	<u>7.93</u>	<u>--</u>
F.O.B. port.....	13.83	40.07
Loading ship.....	3.14	--
Insurance, taxes, commissions.....	5.20	--
Ocean freight, insurance, taxes to Santos.....	8.89	11.26
Unload ship, port charges, taxes.....	5.12	6.17
Haul to Sao Paulo.....	2.16	2.16
Storage in Sao Paulo.....	4.30	5.53
Sacks.....	4.33	4.33
Taxes, bank charges, etc.....	2.86	--
Commissions, distribution expenses, profits...	4.08	14.26
Charge for foreign exchange.....	<u>--</u>	<u>6.49</u>
Total charges and expenses.....	53.91	90.27
Less, subsidy to fertilizer industry.....	<u>8.50</u>	<u>--</u>
Net sales price to farmers.....	45.40	90.27
Price to farmers in the United States, 1965...	21.00	53.60

Sources: (28) and (96).

Table 14.--Colombia: Costs of fertilizers per ton to Bogota farmers compared with costs to farmers in the United States, 1963

Item	Sulphate of ammonia from Germany	Superphosphate from United States	Muriate of potash from Germany
	----- <u>Dollars</u> -----		
C.i.f. Cartagena.....	47.05	58.33	42.11
Freight to Bogota.....	23.33	25.56	25.56
Miscellaneous expenses....	7.73	9.22	6.28
Importers' margin.....	22.22	22.22	27.78
Distributors' margin.....	24.11	34.67	48.27
Sales price, Bogota	124.44	150.00	150.00
Price to farmers in the United States.....	52.00	80.80	53.50

Source: (24) and U.S. Department of Agriculture data.

Table 15.--Latin America and United States: Estimated prices received by farmers per ton for selected countries, 1957-59

Type climate; country and group average	Wheat	Corn	Rice, rough	Sugar- cane	Potatoes	Beans, dry	Cotton fiber	Coffee	Beef ¹	Pork ¹	Milk
----- Dollars -----											
Cool:											
Argentina.....	36	30	48	6	29	-	469	-	252	158	31
Chile.....	59	62	62	-	38	117	-	-	470	375	67
Mexico.....	69	57	69	4	48	103	491	763	244	375	72
Paraguay.....	66	35	61	4	-	55	226	400	103	-	55
Uruguay.....	27	47	47	8	38	-	-	-	193	97	40
Average ²	51	46	57	6	38	92	395	582	252	251	53
Moderate Central America and Caribbean region:											
Costa Rica.....	-	73	84	9	54	101	-	708	308	435	85
Cuba.....	-	65	129	6	66	116	-	947	549	731	104
Dominican Republic.....	-	78	107	4	56	220	-	449	320	543	130
El Salvador.....	-	54	93	9	-	98	557	818	529	599	40
Guatemala.....	130	76	81	9	62	127	561	639	243	564	74
Haiti.....	-	80	79	3	-	-	188	446	320	543	-
Honduras.....	-	64	84	10	-	103	549	710	202	275	127
Nicaragua.....	-	90	87	5	-	130	565	790	264	356	202
Panama.....	-	73	110	6	-	176	-	718	263	-	154
Average ²	130	73	95	7	60	134	484	692	333	506	114
Warm:											
Bolivia.....	76	104	76	4	44	122	-	330	219	522	92
Brazil.....	130	54	108	5	79	150	551	426	158	477	80
Colombia.....	132	54	112	-	56	194	545	698	262	296	83
Ecuador.....	102	89	104	4	52	126	243	533	255	290	58
Peru.....	57	48	69	9	44	122	691	787	264	370	68
Venezuela.....	-	70	160	10	145	231	330	1,089	469	716	205
Average ²	99	70	105	6	70	158	472	644	271	445	98
United States.....	66	43	106	8	40	153	692	-	856	473	90

¹ Estimated on a carcass weight basis. ² Simple average for data shown.

Sources: U.S.D.A., ERS - Foreign 44, Indices of Agricultural Production for the 20 Latin American countries, Prelim. 1966-Jan. 1967, 49 pages.

Table 16.--Brazil and Colombia: Average foreign exchange rates for coffee, 1960-66

Year	Brazil		Colombia	
	On coffee exports	Free rate	Buying	
			Coffee exports	Other exports
	- - <u>Local currency units per dollar</u> - -			
1960	90	205	5.38	7.09
1961	135	318	5.72	8.79
1962	182	475	6.96	11.14
1963	314	620	7.01	9.98
1964	742	1,850	7.30	12.77
1965	887	2,220	8.50	13.50
1966 ¹	939	2,220	9.35	13.50

¹ Through November

Sources: (41), (91).

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